APPLICATION FOR LOW VOLTAGE DIRECTIVE

On Behalf of

Tortech Pty Ltd

Inverter

Model(s): APC1012E, APC1512E, APC2012E, APC3012E

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TEST REPORT
EN 60950-1
Information technology equipment – Safety –
Part 1: General requirements

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Testing Laboratory		
Name ....:	SHENZHEN EMTEK CO., LTD.	
Address ....:	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China	
Testing location / address ....:	Same as above	
Applicant's name ....:	Tortech Pty Ltd	
Test specification:		
Standard...:	EN 60950-1:2006+A11:2009	
Test procedure ....:	Compliance with EN 60950-1:2006+A11:2009	
Non-standard test method…………..:	N/A	
Test item description ....:	Inverter	
Model/Type reference ....:	APC1012E, APC1512E, APC2012E, APC3012E	

Ratings .... :	For model APC1012E: INPUT: 220-240VAC, 50/60Hz, 10A MAX, 1Ø OUTPUT: 220-240VAC, 50/60Hz, 1000W, 1Ø BATTERY: 12VDC For model APC1512E: INPUT: 220-240VAC, 50/60Hz, 20A MAX, 1Ø OUTPUT: 220-240VAC, 50/60Hz, 1500W, 1Ø BATTERY: 12VDC For model APC2012E: INPUT: 220-240VAC, 50/60Hz, 20A MAX, 1Ø OUTPUT: 220-240VAC, 50/60Hz, 2000W, 1Ø BATTERY: 12VDC For model APC3012E: INPUT: 220-240VAC, 50/60Hz, 30A MAX, 1Ø OUTPUT: 220-240VAC, 50/60Hz, 3000W, 1Ø BATTERY: 12VDC

Copy of marking plate:

1. Rating label for model APC1012E:

Uninterruptible Power Supply
Model APC1012E
INPUT: 220-240V~, 50/60Hz, 10A MAX, 1Ø
OUTPUT: 220-240V~, 50/60Hz, 1000W, 1Ø
BATTERY: 12V⎓
Made In China

2. Rating label for model APC1512E:

Uninterruptible Power Supply
Model APC1512E
INPUT: 220-240V~, 50/60Hz, 20A MAX, 1Ø
OUTPUT: 220-240V~, 50/60Hz, 1500W, 1Ø
BATTERY: 12V⎓
Made In China

3. Rating label for model APC2012E:

Uninterruptible Power Supply
Model APC2012E
INPUT: 220-240V~, 50/60Hz, 20A MAX, 1Ø
OUTPUT: 220-240V~, 50/60Hz, 2000W, 1Ø
BATTERY: 12V⎓
Made In China

4. Rating label for model APC3012E:

Uninterruptible Power Supply
Model APC3012E
INPUT: 220-240V~, 50/60Hz, 30A MAX, 1Ø
OUTPUT: 220-240V~, 50/60Hz, 3000W, 1Ø
BATTERY: 12V⎓

Made In China

Test item particulars	
Equipment mobility.......................................:	☐ movable ☐ hand-held ☐ transportable ☒ stationary ☐ fixed ☐ direct plug-in ☐ for building-in
Connection to the mains ....:	☐ pluggable equipment ☐type A ☐type B ☒ permanent connection
Operating condition.......................................:	☒ continuous ☐ short-time ☐ intermittent
Over voltage category ....:	☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV
Mains supply tolerance (%)............................:	220Vac(-10%), 240Vac(+10%)
Tested for IT power systems ....:	☐ Yes ☒ No
IT testing, phase-phase voltage (V) ....:	N/A
Class of equipment ....:	☒ Class I ☐ Class II ☐ Class III ☐ Not classified
Mass of equipment (kg) ....:	>18kg
Pollution degree ....:	☒ PD 2 ☐ PD 3
IP protection class ....:	IP20
Possible test case verdicts:	
- test case does not apply to the test object ....:	N (N/A)
- test object does meet the requirement.......................:	P (Pass)
- test object does not meet the requirement.................:	F (Fail)
Testing	
Date of receipt of test item ....:	October 17, 2011
Date(s) of performance of tests ....:	October 17, 2011 to October 27, 2011

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

General product information:

The equipment is a inverter for general use with information technology equipment.

Double/reinforced insulation provided between primary circuits and SELV circuits by safety isolation transformer (main transformer, current transformer CT1), Relay (RY01) and sufficient clearances and creepage distances within the unit.

Model difference description:

Models APC1012E, APC1512E and APC2012E are similar to model APC3012E except for main transformer, some components etc.

Summary of testing:

The product has been tested according to standard EN 60950-1:2006+A11:2009

- Tests performed on the bench
- Maximum ambient temperature: +40°C
- Tested for tropical conditions
- EUT is designed for altitudes not exceeding 2000 m.

This series of Uninterruptible Power Supply generally uses the same circuit diagrams. Unless otherwise specified, the tests are conducted on model APC3012E considered the worst condition.

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
1	GENERAL		P
1.5	Components		P
1.5.1	General		P
	Comply with IEC 60950 or relevant component standard	Components, which were found to affect safety aspects comply with the requirements of this aspects of the relevant IEC component standards. (see appended table 1.5.1)	P
1.5.2	Evaluation and testing of components	Components, which are certified to IEC or national standards, are applied correctly within their ratings. Components not covered by IEC standards are tested under the conditions present in the equipment.	P
1.5.3	Thermal controls	No thermal controls provided.	N
1.5.4	Transformers	Transformers used are suitable for their intended application and comply with the relevant requirements of the standard.	P
1.5.5	Interconnecting cables	Interconnecting cables are suitable for their intended application and comply with the relevant requirements of the standard.	P
1.5.6	Capacitors bridging insulation	X1 or X2 capacitors according to IEC 60384- 14:1993. (see appended table 1.5.1)	P
1.5.7	Resistors bridging insulation		P
1.5.7.1	Resistors bridging functional, basic or supplementary insulation	No such parts.	N

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.5.7.2	Resistors bridging double or reinforced insulation between a.c. mains and other circuits	Double/ reinforced insulation bridged by following resistors: 1. R177, R199, R219, R218, R196, R197, R209, R208, R188, R184, R185, R186, R206, R207, R189, R205 (I/P “N”) (499kΩ) 2. R180, R191, R214, R213, R201, R202, R212, R215, R190, R181, R187, R200, R217, R216, R192, R198 (I/P “L”) (499kΩ) 3. R265, R249, R255, R244, R266, R270, R256, R271, R237, R269, R234, R236, R267, R254, R235, R204 (O/P “N”) (499kΩ) 4. R231, R240, R261, R260, R247, R248, R259, R262, R241, R232, R233, R248, R264, R263, RR239, R203 (O/P “L”) (499KΩ)	P
1.5.7.3	Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable		N
1.5.7.4	Accessible parts	See 2.4	P
1.5.8	Components in equipment for IT power systems	TN power system.	P
1.5.9	Surge suppressors	No such parts.	N
1.5.9.1	General		N
1.5.9.2	Protection of VDRs		N
1.5.9.3	Bridging of functional insulation by a VDR	No such parts.	N
1.5.9.4	Bridging of basic insulation by a VDR	No such parts.	N
1.5.9.5	Bridging of supplementary, double or reinforced insulation by a VDR	No such parts.	N
1.6	Power interface		P
1.6.1	AC power distribution systems	For connection to TN power system.	P
1.6.2	Input current	(see appended table 1.6.2)	P
1.6.3	Voltage limit of hand-held equipment	This appliance is not a hand-held equipment.	N
1.6.4	Neutral conductor	Basic insulation of rated voltage between primary phase and neutral.	P

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Clause	Requirement + Test	Result - Remark	Verdict
1.7	Marking and instructions		P
1.7.1	Power rating	See below.	P
	Rated voltage(s) or voltage range(s) (V) .... :	220-240Vac	P
	Symbol for nature of supply, for d.c. only.............. :	AC source	P
	Rated frequency or rated frequency range (Hz) ... :	50/60Hz	P
	Rated current (mA or A) .... :	See rating label	P
	Manufacturer's name or trade-mark or identification mark .... :	EYEN	P
	Model identification or type reference .... :	APC1012E, APC1512E, APC2012E, APC3012E	P
	Symbol for Class II equipment only .... :	Class I equipment.	N
	Other markings and symbols .... :	There is no additional marking.	N
1.7.2	Safety instructions and marking	The user manual contains information for operation, installation, servicing transport, storage and technical data.	P
1.7.2.1	General		P
1.7.2.2	Disconnect devices	The installation instructions are state that: "For PERMANENTLY CONNECTED EQUIPMENT, a readily accessible disconnect device shall be incorporated external to the equipment."	P
1.7.2.3	Overcurrent protective device		P
1.7.2.4	IT power distribution systems	TN power distribution systems	N
1.7.2.5	Operator access with a tool	All areas containing hazard(s) are inaccessible to the operator.	P
1.2.7.6	Ozone	The equipment does not produce Ozone.	N
1.7.3	Short duty cycles	Equipment is designed for continuous operation.	N
1.7.4	Supply voltage adjustment .... :	No voltage selector.	N
	Methods and means of adjustment; reference to installation instructions .... :		N
1.7.5	Power outlets on the equipment .... :	No outlet provided	N
1.7.6	Fuse identification (marking, special fusing characteristics, cross-reference) .... :	Circuit breaker provided	N
1.7.7	Wiring terminals	See below	P

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Clause	Requirement + Test	Result - Remark	Verdict
1.7.7.1	Protective earthing and bonding terminals .... :		P
1.7.7.2	Terminals for a.c. mains supply conductors	Unit employs a terminal.	P
1.7.7.3	Terminals for d.c. mains supply conductors	The equipment is not supplied from d.c mains.	N
1.7.8	Controls and indicators		P
1.7.8.1	Identification, location and marking .... :		P
1.7.8.2	Colours .... :	Colors are acceptable due to only used for information (no safety involved even if disregarded).	P
1.7.8.3	Symbols according to IEC 60417 ....:	No standby power switch.	N
1.7.8.4	Markings using figures ....:	Not used.	N
1.7.9	Isolation of multiple power sources ....:	Only connected to AC mains	N
1.7.10	Thermostats and other regulating devices ....:	No thermostats or other regulating devices.	N
1.7.11	Durability	The marking withstands required tests. (see appended table 1.7.11)	P
1.7.12	Removable parts	No removable parts.	N
1.7.13	Replaceable batteries ....:	Additional warning statement of explosion if replaced with different batteries during servicing is marked on the rear panel.	P
	Language(s) ....:	English	--
1.7.14	Equipment for restricted access locations............:	Operator is not instructed to use a tool in order to gain access to operator access area.	N

2	PROTECTION FROM HAZARDS		P
2.1	Protection from electric shock and energy hazards		P
2.1.1	Protection in operator access areas	Operator only has access to SELV circuits and enclosure outer surface.	P
2.1.1.1	Access to energized parts	No hazardous live part is accessible.	P
	Test by inspection .... :	Operator can not contact with any parts with hazardous voltage.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test with test finger (Figure 2A) .... :	Test finger applied to openings of ventilation side. No hazardous voltage parts accessible	P
	Test with test pin (Figure 2B) .... :	The test pin can not touch hazardous voltage.	P
	Test with test probe (Figure 2C) .... :		N
2.1.1.2	Battery compartments	No battery compartment.	N
2.1.1.3	Access to ELV wiring	No ELV wiring in operator accessible area.	N
	Working voltage (Vpeak or Vrms); minimum distance through insulation (mm)		--
2.1.1.4	Access to hazardous voltage circuit wiring	No hazardous voltage wiring in operator accessible area.	N
2.1.1.5	Energy hazards .... :	Test finger applied to DC terminal. No bridge parts accessible.	P
2.1.1.6	Manual controls	Standby push button is of insulating material.	P
2.1.1.7	Discharge of capacitors in equipment	No risk of electric shock.	P
	Measured voltage (V); time-constant (s) .... :	(see appended table 2.1.1.7)	--
2.1.1.8	Energy hazards – d.c. mains supply	Not connected to DC mains supply.	N
	a) Capacitor connected to the d.c. mains supply . :		N
	b) Internal battery connected to the d.c. mains supply .... :		N
2.1.1.9	Audio amplifiers .... :	No audio amplifier.	N
2.1.2	Protection in service access areas	No service access area.	N
2.1.3	Protection in restricted access locations	The unit is not limited to be used in restricted access locations	N

2.2	SELV circuits		P
2.2.1	General requirements	The secondary circuits were tested as SELV.	P
2.2.2	Voltages under normal conditions (V) .... :	Not exceed 42.4V peak or 60V dc in SELV circuit under normal operation.	P
2.2.3	Voltages under fault conditions (V) .... :	Single fault cause did not excessive voltage in accessible SELV circuits. (see appended table 2.2.2 and 5.3)	P

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Clause	Requirement + Test	Result - Remark	Verdict
2.2.4	Connection of SELV circuits to other circuits ......:	SELV circuits are only connected to other SELV circuits.	P
2.3	TNV circuits		N
2.3.1	Limits		N
	Type of TNV circuits .... :		--
2.3.2	Separation from other circuits and from accessible parts		N
2.3.2.1	General requirements		N
2.3.2.2	Protection by basic insulation		N
2.3.2.3	Protection by earthing		N
2.3.2.4	Protection by other constructions .... :		N
2.3.3	Separation from hazardous voltages		N
	Insulation employed... :		--
2.3.4	Connection of TNV circuits to other circuits		N
	Insulation employed... :		--
2.3.5	Test for operating voltages generated externally		N
2.4	Limited current circuits		P
2.4.1	General requirements	Backfeed protection provided by safety relay which is mounted on the main PCB. The backfeed protection circuit works reliably in normal and single-fault condition.	P
2.4.2	Limit values		P
	Frequency (Hz)... :	(see appended table 2.4.2)	P
	Measured current (mA).. :	(see appended table 2.4.2)	P
	Measured voltage (V) .... :	(see appended table 2.4.2)	P
	Measured circuit capacitance (nF or µF)............... :		--
2.4.3	Connection of limited current circuits to other circuits	Only intended to be connected with SELV circuits	N
2.5	Limited power sources	(Not applied for)	N
	a) Inherently limited output		N
	b) Impedance limited output		N

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Clause	Requirement + Test	Result - Remark	Verdict
	c) Regulating network limited output under normal operating and single fault condition		N
	d) Overcurrent protective device limited output		N
	Max. output voltage (V), max. output current (A), max. apparent power (VA)..................................... :		N
	Current rating of overcurrent protective device (A)		N
2.6	Provisions for earthing and bonding		P
2.6.1	Protective earthing	Reliable connection of relevant conductive parts to the PE terminal by appliance inlet.	P
2.6.2	Functional earthing	Compliance checked.	P
2.6.3	Protective earthing and protective bonding conductors	Protective earthing and protective bonding conductors have sufficient current-carrying capacity.	P
2.6.3.1	General		P
2.6.3.2	Size of protective earthing conductors		P
	Rated current (A), cross-sectional area (mm^2), AWG .... :		--
2.6.3.3	Size of protective bonding conductors		P
	Rated current (A), cross-sectional area (mm^2), AWG .... :	According to table 3B. 10AWG minimum.	P
2.6.3.4	Resistance of earthing conductors and their terminations; resistance (Ω), voltage drop (V), test current (A), duration (min) .... :	≤0.1Ω, see appended table 2.6.3.3	P
2.6.3.5	Colour of insulation... :	Green-yellow.	P
2.6.4	Terminals		N
2.6.4.1	General		N
2.6.4.2	Protective earthing and bonding terminals		N
	Rated current (A), type, nominal thread diameter (mm)... :		--
2.6.4.3	Separation of the protective earthing conductor from protective bonding conductors		N
2.6.5	Integrity of protective earthing		N
2.6.5.1	Interconnection of equipment	No interconnection of equipment.	N

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Clause	Requirement + Test	Result - Remark	Verdict
2.6.5.2	Components in protective earthing conductors and protective bonding conductors	There are no switches or overcurrent protective devices in the protective earthing / bonding conductors.	P
2.6.5.3	Disconnection of protective earth	It is not possible to disconnect protective earth without disconnecting mains; an appliance coupler is used as disconnect device.	P
2.6.5.4	Parts that can be removed by an operator	No operator removable parts with protective earth connection except supply cord.	P
2.6.5.5	Parts removed during servicing	Protective earthed parts cannot be removed in a way which impairs safety.	P
2.6.5.6	Corrosion resistance	No risk of corrosion.	P
2.6.5.7	Screws for protective bonding		P
2.6.5.8	Reliance on telecommunication network or cable distribution system	Protective earthing does not rely on a telecommunication network.	N
2.7	Overcurrent and earth fault protection in primary circuits		P
2.7.1	Basic requirements	Protective device is integrated in the equipment, see also Sub-clause 5.3.	P
	Instructions when protection relies on building installation	Protective device is integrated in the equipment, see also Sub-clause 5.3.	P
2.7.2	Faults not simulated in 5.3.7		N
2.7.3	Short-circuit backup protection	Adequate protective device.	P
2.7.4	Number and location of protective devices .... :	In Norway, IT power distribution system is used. Equipment with a single protective device is accepted in Norway. Other countries (e.g. Germany and Belgium) may have additional requirements.	P
2.7.5	Protection by several devices	Only one protective device. See Sub-clause 2.7.4.	P

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Clause	Requirement + Test	Result - Remark	Verdict
2.7.6	Warning to service personnel ....:	After operation of the protective device, the equipment is still under voltage if it is connected to an IT-power distribution system. A warning is required for service persons. Norway does not require this warning. See also Sub-clause 2.7.4.	N
2.8	Safety interlocks		N
2.8.1	General principles	No safety interlocks.	N
2.8.2	Protection requirements		N
2.8.3	Inadvertent reactivation		N
2.8.4	Fail-safe operation		N
2.8.5	Moving parts		N
2.8.6	Overriding		N
2.8.7	Switches and relays		N
2.8.7.1	Contact gaps (mm) ....:		N
2.8.7.2	Overload test		N
2.8.7.3	Endurance test		N
2.8.7.4	Electric strength test		N
2.8.8	Mechanical actuators		N
2.9	Electrical insulation		P
2.9.1	Properties of insulating materials	Suitable material according to their thermal electrical and mechanical properties.	P
2.9.2	Humidity conditioning	Humidity treatment performed for 48 hrs.	P
	Relative humidity (%), temperature (°C) ....:	90-95%, 30°C.	P
2.9.3	Grade of insulation	The adequate levels of safety insulation is provided and maintained to comply with the requirements of this standard	P
2.9.4	Separation from hazardous voltages	See below.	P
	Method(s) used ....:	Method 1 and 2	--
2.10	Clearances, creepage distances and distances through insulation		P
2.10.1	General		P
2.10.1.1	Frequency ....:	Considered.	P

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.1.2	Pollution degrees .... :	Pollution Degree 2.	P
2.10.1.3	Reduced values for functional insualtion	The functional insulation complied with clause 5.3.4.	P
2.10.1.4	Intervening unconnected conductive parts	Considered.	P
2.10.1.5	Insulation with varying dimensions	No such transformer used.	N
2.10.1.6	Special separation requirements	Special separation is not used.	N
2.10.1.7	Insulation in circuits generating starting pulses	No insulation in circuit generating starting pulses.	N
2.10.2	Determination of working voltage	(See appended table 2.10.2)	P
2.10.2.1	General		P
2.10.2.2	RMS working voltage	(See appended table 2.10.2)	P
2.10.2.3	Peak working voltage	(See appended table 2.10.2)	P
2.10.3	Clearances	(see appended table 2.10.3 and 2.10.4)	P
2.10.3.1	General		P
2.10.3.2	Mains transient voltages	Normal transient voltage considered	N
	a) AC mains supply .... :		N
	b) Earthed d.c. mains supplies .... :		N
	c) Unearthed d.c. mains supplies .... :		N
	d) Battery operation .... :		N
2.10.3.3	Clearances in primary circuits	(see appended table 2.10.3 and 2.10.4)	P
2.10.3.4	Clearances in secondary circuits	Only the functional insulation in secondary circuits complied with clause 5.3.4.	N
2.10.3.5	Clearances in circuits having starting pulses	The circuit will not generating starting pulse.	N
2.10.3.6	Transients from a.c. mains supply .... :	Considered.	P
2.10.3.7	Transients from d.c. mains supply .... :	Not connected to d.c mains supply.	N
2.10.3.8	Transients from telecommunication networks and cable distribution systems .... :	Not connected to telecommunication networks and cable distribution systems.	N
2.10.3.9	Measurement of transient voltage levels	Normal transient voltage considered	N
	a) Transients from a mains suplply		N
	For an a.c. mains supply .... :		N
	For a d.c. mains supply .... :		N

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Transients from a telecommunication network :		N
2.10.4	Creepage distances		P
2.10.4.1	General	Considered	P
2.10.4.2	Material group and caomparative tracking index		P
	CTI tests .... :	Material group IIIb is assumed to be used	P
2.10.4.3	Minimum creepage distances	(see appended table 2.10.3 and 2.10.4)	P
2.10.5	Solid insulation	Solid or laminated insulating materials having adequate thickness are provided.	P
2.10.5.1	General	Considered.	P
2.10.5.2	Distances through insulation	(see appended table 2.10.5)	P
2.10.5.3	Insulating compound as solid insulation	No such construction used.	N
2.10.5.4	Semiconductor devices	No such component used.	N
2.10.5.5.	Cemented joints	Not used.	N
2.10.5.6	Thin sheet material – General	Thin sheet material in form of polyester tape used in transformer	P
2.10.5.7	Separable thin sheet material		P
	Number of layers (pcs) .... :	3 layers	P
2.10.5.8	Non-separable thin sheet material	Not used.	N
2.10.5.9	Thin sheet material – standard test procedure	Not used.	N
	Electric strength test		--
2.10.5.10	Thin sheet material – alternative test procedure	(see appended table 2.10.5)	P
	Electric strength test	(see appended table 2.10.5)	P
2.10.5.11	Insulation in wound components	Not used.	N
2.10.5.12	Wire in wound components		N
	Working voltage .... :		N
	a) Basic insulation not under stress .... :		N
	b) Basic, supplemetary, reinforced insulation .... :		N
	c) Compliance with Annex U .... :		N
	Two wires in contact inside wound component; angle between 45° and 90° .... :		N
2.10.5.13	Wire with solvent-based enamel in wound components	No wire with solvent-based enamel in wound components.	N
	Electric strength test		N
	Routine test		N

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.5.14	Additional insulation in wound components	No additional insulation used.	N
	Working voltage .... :		N
	- Basic insulation not under stress .... :		N
	- Supplemetary, reinforced insulation .... :		N
2.10.6	Construction of printed boards	See below.	P
2.10.6.1	Uncoated printed boards	(see appended table 2.10.3 and 2.10.4)	P
2.10.6.2	Coated printed boards		N
2.10.6.3	Insulation between conductors on the same inner surface of a printed board		N
2.10.6.4	Insulation between conductors on different layers of a printed board		N
	Distance through insulation		N
	Number of insulation layers (pcs).......................... :		N
2.10.7	Component external terminations	Coatings not used over terminations to increase effective creepage and clearance distances.	N
2.10.8	Tests on coated printed boards and coated components	No special coating in order to reduce distance.	N
2.10.8.1	Sample preparation and preliminary inspection		N
2.10.8.2	Thermal conditioning		N
2.10.8.3	Electric strength test		N
2.10.8.4	Abrasion resistance test		N
2.10.9	Thermal cycling	No special insulation in order to reduce distance.	N
2.10.10	Test for Pollution Degree 1 environment and insulating compound	For relay, see appended table 1.5.1.	P
2.10.11	Tests for semiconductor devices and cemented joints	No such device used.	N
2.10.12	Enclosed and sealed parts	For relay, see appended table 1.5.1.	P
3	WIRING, CONNECTIONS AND SUPPLY		P
3.1	General		P
3.1.1	Current rating and overcurrent protection	Adequate cross sectional areas on internal wiring.	P

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Clause	Requirement + Test	Result - Remark	Verdict
3.1.2	Protection against mechanical damage	Wireways are smooth and free from edges. Wires are adequately fixed to prevent excessive strain on wire and terminals and avoiding damage to the insulation of the conductors.	P
3.1.3	Securing of internal wiring	Internal wiring is secured against excessive strain, loosening of terminals and damage to the conductor insulation.	P
3.1.4	Insulation of conductors	Insulation on internal conductors is considered to be of adequate quality and suitable for the application and the working voltage involved.	P
3.1.5	Beads and ceramic insulators	No beads or similar ceramic insulators on conductors.	N
3.1.6	Screws for electrical contact pressure	No screw for electrical contact.	N
3.1.7	Insulating materials in electrical connections	No contact pressure through insulating material.	P
3.1.8	Self-tapping and spaced thread screws	Thread-cutting or space thread screws are not used for electrical connections.	P
3.1.9	Termination of conductors	Terminations cannot become displaced so that clearances and creepage distances can be reduced.	P
	10 N pull test	Conducted.	P
3.1.10	Sleeving on wiring	Sleeves are used as supplementary insulation.	P
3.2	Connection to a mains supply		P
3.2.1	Means of connection	The unit is provided with a terminal for permanent connection to the supply.	P
3.2.1.1	Connection to an a.c. mains supply	For connection to the supply by terminal.	P
3.2.1.2	Connection to a d.c. mains supply	The equipment is not for connection to a d.c. mains supply.	N
3.2.2	Multiple supply connections	Only one supply connection.	N

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Clause	Requirement + Test	Result - Remark	Verdict
3.2.3	Permanently connected equipment	The equipment is not intended for permanent connection to the mains.	N
	Number of conductors, diameter of cable and conduits (mm) .... :		--
3.2.4	Appliance inlets	Not provided	N
3.2.5	Power supply cords		N
3.2.5.1	AC power supply cords		N
	Type .... :		N
	Rated current (A), cross-sectional area (mm^2), AWG .... :		N
3.2.5.2	DC power supply cords	Not provided.	N
3.2.6	Cord anchorages and strain relief		N
	Mass of equipment (kg), pull (N) .... :		--
	Longitudinal displacement (mm) .... :		--
3.2.7	Protection against mechanical damage	No sharp points or cutting edges on the equipment surfaces.	N
3.2.8	Cord guards	The equipment is neither hand-held nor intended to be moved during operation.	N
	Diameter or minor dimension D (mm); test mass (g) .... :		--
	Radius of curvature of cord (mm).......................... :		--
3.2.9	Supply wiring space		N
3.3	Wiring terminals for connection of external conductors		P
3.3.1	Wiring terminals		N
3.3.2	Connection of non-detachable power supply cords		N
3.3.3	Screw terminals		P
3.3.4	Conductor sizes to be connected		P
	Rated current (A), cord/cable type, cross-sectional area (mm^2).. :		--
3.3.5	Wiring terminal sizes		N
	Rated current (A), type, nominal thread diameter (mm) .... :		--
3.3.6	Wiring terminal design		N
3.3.7	Grouping of wiring terminals		N
3.3.8	Stranded wire		N

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Clause	Requirement + Test	Result - Remark	Verdict

3.4	Disconnection from the mains supply		P
3.4.1	General requirement	See Sub-clause 3.4.2.	P
3.4.2	Disconnect devices	Permanently connected equipment.	P
3.4.3	Permanently connected equipment	External disconnect devices would be supplied with the equipment.	P
3.4.4	Parts which remain energized	When supply is disconnected, there are no parts remaining with hazardous voltage or energy in the equipment.	P
3.4.5	Switches in flexible cords	No switch.	N
3.4.6	Number of poles - single-phase and d.c. equipment	The disconnect device disconnects both poles simultaneously.	P
3.4.7	Number of poles - three-phase equipment	Single phase equipment.	N
3.4.8	Switches as disconnect devices	No switches provided.	N
3.4.9	Plugs as disconnect devices	The appliance coupler is regarded as disconnect device, no warning is required.	N
3.4.10	Interconnected equipment	No interconnections using hazardous voltages.	N
3.4.11	Multiple power sources	One power source only.	N

3.5	Interconnection of equipment		P
3.5.1	General requirements	SELV voltage connections for the output. Not compatible with connection for the input.	P
3.5.2	Types of interconnection circuits ....:	See 3.5.1	P
3.5.3	ELV circuits as interconnection circuits	No ELV interconnection.	N
3.5.4	Data ports for additional equipment	No data ports.	N

4	PHYSICAL REQUIREMENTS		P
4.1	Stability		P
	Angle of 10°	The unit do not overbalance when tilted to an angle of 10 degree.	P
	Test force (N) .... :		P

4.2	Mechanical strength		P

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Clause	Requirement + Test	Result - Remark	Verdict
4.2.1	General	Tests performed and passed. Results see below. After the tests, unit complied with the requirements of sub-clauses 2.1.1, 2.6.1, 2.10 and 4.4.1.	P
4.2.2	Steady force test, 10 N	10 N applied to components.	P
4.2.3	Steady force test, 30 N	30 N applied to parts inside the UPS.	P
4.2.4	Steady force test, 250 N	250 N applied to outer enclosure. No energy or other hazards.	P
4.2.5	Impact test	No hazard as a result from steel ball impact test.	P
	Fall test	No hazard as a result from steel ball impact test.	P
	Swing test	No hazard as result from steel sphere ball swung test.	P
4.2.6	Drop test; height (mm) .... :	Not required for this equipment.	N
4.2.7	Stress relief test	Not required for this equipment.	N
4.2.8	Cathode ray tubes	No cathode ray tube.	N
	Picture tube separately certified .... :		--
4.2.9	High pressure lamps	No high pressure lamp provided.	N
4.2.10	Wall or ceiling mounted equipment; force (N) ...... :	Not for wall or ceiling mounting.	N

4.3	Design and construction		
4.3.1	Edges and corners	Edges and corners of the enclosure are rounded.	P
4.3.2	Handles and manual controls; force (N).............:	No axial pull applied to pushbutton of stand-by switch because it is unlikely to be pulled.	N
4.3.3	Adjustable controls	No adjustable controls.	N
4.3.4	Securing of parts	Mechanical fixings in such a way designed that they will withstand mechanical stress occurring in normal use.	P
4.3.5	Connection by plugs and sockets	No mismatch of connectors.	P
4.3.6	Direct plug-in equipment	Not direct plug-in type.	N

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Clause	Requirement + Test	Result - Remark	Verdict
	Torque .... :		--
	Compliance with the relevant mains plug standard .... :		--
4.3.7	Heating elements in earthed equipment	No heating elements provided.	N
4.3.8	Batteries	No batteries	N
	- Overcharging of a rechargeable battery		N
	- Unintentional charging of a non-rechargeable battery		N
	- Reverse charging of a rechargeable battery		N
	- Excessive discharging rate for any battery		N
4.3.9	Oil and grease	Insulation is not exposed to oil, grease etc.	N
4.3.10	Dust, powders, liquids and gases	The equipment does not generate ionizing radiation or use a laser, and does not contain flammable liquids or gases.	N
4.3.11	Containers for liquids or gases	No containers for liquids or gases in the equipment.	N
4.3.12	Flammable liquids .... :	The equipment does not contain flammable liquid.	N
	Quantity of liquid (l) .... :		--
	Flash point (°C) .... :		--
4.3.13	Radiation		P
4.3.13.1	General		P
4.3.13.2	Ionizing radiation	No ionising radiation.	N
	Measured radiation (pA/kg) .... :		N
	Measured high-voltage (kV) .... :		N
	Measured focus voltage (kV) .... :		N
	CRT markings .... :		N
4.3.13.3	Effect of ultraviolet (UV) radiation on materials	No ultraviolet radiation.	N
	Part, property, retention after test, flammability classification .... :		N
4.3.13.4	Human exposure to ultraviolet (UV) radiation ..... :		N
4.3.13.5	Laser (including LEDs)	Non-lasing LEDs provided for indicating only.	P
	Laser class .... :	Class 1	--

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Clause	Requirement + Test	Result - Remark	Verdict
4.3.13.6	Other types .... :	The equipment does not generate other types of radiation.	N
4.4	Protection against hazardous moving parts		P
4.4.1	General	DC fan located at secondary circuit. The enclosure of the unit provide as fan guard. Test finger applied to openings. No fan blade accessible.	P
4.4.2	Protection in operator access areas .... :	See above.	P
4.4.3	Protection in restricted access locations .... :	Not for restricted access locations.	N
4.4.4	Protection in service access areas	See 4.4.1	P
4.5	Thermal requirements		P
4.5.1	General		P
4.5.2	Temperature tests	(see appended table 4.5)	P
	Normal load condition per Annex L .... :		P
4.5.3	Temperature limits for materials	(see appended table 4.5)	P
4.5.4	Touch temperature limits	(see appended table 4.5)	P
4.5.5	Resistance to abnormal heat .... :	(see appended table 4.5.5)	P
4.6	Openings in enclosures		P
4.6.1	Top and side openings	See appended table 4.6.1 and 4.6.2	P
	Dimensions (mm) .... :		P
4.6.2	Bottoms of fire enclosures	See appended table 4.6.1 and 4.6.2	P
	Construction of the bottomm, dimensions (mm) .. :		--
4.6.3	Doors or covers in fire enclosures	No doors or covers in fire enclosure.	N
4.6.4	Openings in transportable equipment	Not transportable equipment.	N
4.6.4.1	Constructional design measures		N
	Dimensions (mm) .... :		--
4.6.4.2	Evaluation measures for larger openings		N
4.6.4.3	Use of metallized parts		N
4.6.5	Adhesives for constructional purposes	No adhesives used for constructional purposes.	N

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Clause	Requirement + Test	Result - Remark	Verdict
	Conditioning temperature (°C), time (weeks) .... :		--
4.7	Resistance to fire		P
4.7.1	Reducing the risk of ignition and spread of flame	Method 1 is used.	P
	Method 1, selection and application of components wiring and materials	Method 1 used. No excessive temperatures. No easily burning materials employed. Safety relevant components used within their specified temperature limits. (see appended table 4.7)	P
	Method 2, application of all of simulated fault condition tests	Not used method 2.	N
4.7.2	Conditions for a fire enclosure	For all parts inside enclosure, a fire enclosure is required.	P
4.7.2.1	Parts requiring a fire enclosure		P
4.7.2.2	Parts not requiring a fire enclosure		N
4.7.3	Materials		P
4.7.3.1	General	Components and materials have adequate flammability classification. For details see table 1.5.1	P
4.7.3.2	Materials for fire enclosures	Metal material.	P
4.7.3.3	Materials for components and other parts outside fire enclosures	No parts outside the fire enclosure.	P
4.7.3.4	Materials for components and other parts inside fire enclosures	Other materials inside fire enclosure are minimum V-2 material.	P
4.7.3.5	Materials for air filter assemblies	No air filters in the equipment.	N
4.7.3.6	Materials used in high-voltage components	No parts exceeding 4kV.	N
5	ELECTRICAL REQUIREMENTS AND SIMULATED ABNORMAL CONDITIONS		P
5.1	Touch current and protective conductor current		P
5.1.1	General	Test conducted in accordance with 5.1.2 to 5.1.7.	P
5.1.2	Configuration of equipment under test (EUT)	EUT has only one mains connection.	P
5.1.2.1	Single connection to an a.c. mains supply	No interconnection of equipment.	P
5.1.2.2	Redundant multiple connections to an a.c. mains supply	No multiple power sources.	N

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Clause	Requirement + Test	Result - Remark	Verdict
5.1.2.3	Simultaneous multiple connections to an a.c. mains supply	No multiple power sources.	N
5.1.3	Test circuit	Using figure 5A.	P
5.1.4	Application of measuring instrument	Measuring instrument D1 is used.	P
5.1.5	Test procedure	The touch current was measured from primary to enclosure and primary to output.	P
5.1.6	Test measurements		P
	Supply voltage (V) ....:	(See appended table 5.1)	--
	Measured touch current (mA) ....:	(See appended table 5.1)	--
	Max. allowed touch current (mA) ....:	(See appended table 5.1)	--
	Measured protective conductor current (mA) ....:		--
	Max. allowed protective conductor current (mA)...:		--
5.1.7	Equipment with touch current exceeding 3,5 mA	The touch current does not exceed 3.5mA.	N
5.1.7.1	General ....:		N
5.1.7.2	Simultaneous multiple connections to the supply		N
5.1.8	Touch currents to telecommunication networks and cable distribution systems and from telecommunication networks		N
5.1.8.1	Limitation of the touch current to a telecommunication network or to a cable distribution system	No test necessary.	N
	Supply voltage (V) ....:		--
	Measured touch current (mA) ....:		--
	Max. allowed touch current (mA) ....:		--
5.1.8.2	Summation of touch currents from telecommunication networks		N
	a) EUT with earthed telecommunication ports .....:		N
	b) EUT whose telecommunication ports have no reference to protective earth		N

5.2	Electric strength		P
5.2.1	General	(see appended table 5.2)	P
5.2.2	Test procedure	(see appended table 5.2)	P

5.3	Abnormal operating and fault conditions		P

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Clause	Requirement + Test	Result - Remark	Verdict

5.3.1	Protection against overload and abnormal operation	(see appended table 5.3)	P
5.3.2	Motors	TÜV approved DC fan used in secondary circuit.	P
5.3.3	Transformers	(see appended Annex C)	P
5.3.4	Functional insulation..:	Short-circuited, results see appended table 5.3.	P
5.3.5	Electromechanical components	No electromechanical components.	N
5.3.6	Audio amplifiers in ITE ....:	No audio amplifier in equipment.	N
5.3.7	Simulation of faults	Results see appended table 5.3.	P
5.3.8	Unattended equipment	No thermostats, temperature limiters or thermal cut-outs.	P
5.3.9	Compliance criteria for abnormal operating and fault conditions	See below.	P
5.3.9.1	During the tests	No fire or molten metal occurred and no deformation of enclosure during the tests.	P
5.3.9.2	After the tests	No reduction of clearance and creepage distances. Electric strength test is made on Funcational, Basic and reinforced insulation.	P

6	CONNECTION TO TELECOMMUNICATION NETWORKS		N
6.1	Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment		N
6.1.1	Protection from hazardous voltages		N
6.1.2	Separation of the telecommunication network from earth		N
6.1.2.1	Requirements		N
	Supply voltage (V) .... :	1.	N
	Current in the test circuit (mA) ....:		--
6.1.2.2	Exclusions .... :		N

6.2	Protection of equipment users from overvoltages on telecommunication networks		N
6.2.1	Separation requirements		N
6.2.2	Electric strength test procedure		N
6.2.2.1	Impulse test		N
6.2.2.2	Steady-state test		N

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Clause	Requirement + Test	Result - Remark	Verdict
6.2.2.3	Compliance criteria		N
6.3	Protection of the telecommunication wiring system from overheating *(The circuit is not intended to supply other units via telecommunication wiring system.)*		N
	Max. output current (A) .... :		N
	Current limiting method .... :		N
7	CONNECTION TO CABLE DISTRIBUTION SYSTEMS		N
7.1	General	Not connected to Cable Distribution System.	N
7.2	Protection of cable distribution system service persons, and users of other equipment connected to the system, from hazardous voltages in the equipment		N
7.3	Protection of equipment users from overvoltages on the cable distribution system		N
7.4	Insulation between primary circuits and cable distribution systems		N
7.4.1	General		N
7.4.2	Voltage surge test		N
7.4.3	Impulse test		N
A	ANNEX A, TESTS FOR RESISTANCE TO HEAT AND FIRE		N
A.1	Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment (see 4.7.3.2)		N
A.1.1	Samples.. :		N
	Wall thickness (mm) .... :		--
A.1.2	Conditioning of samples; temperature (°C) .... :		N
A.1.3	Mounting of samples .... :		N
A.1.4	Test flame (see IEC 60695-11-3)		N
	Flame A, B, C or D .... :		--
A.1.5	Test procedure		N
A.1.6	Compliance criteria		N
	Sample 1 burning time (s) .... :		--
	Sample 2 burning time (s) .... :		--
	Sample 3 burning time (s) .... :		--

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Clause	Requirement + Test	Result - Remark	Verdict

A.2	Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2 and 4.7.3.4)		N
A.2.1	Samples, material .... :		N
	Wall thickness (mm) .... :		--
A.2.2	Conditioning of samples; temperature (°C) .... :		N
A.2.3	Mounting of samples .... :		N
A.2.4	Test flame (see IEC 60695-11-4)		N
	Flame A, B or C .... :		--
A.2.5	Test procedure		N
A.2.6	Compliance criteria		N
	Sample 1 burning time (s) .... :		--
	Sample 2 burning time (s) .... :		--
	Sample 3 burning time (s) .... :		--
A.2.7	Alternative test acc. to IEC 60695-11-5, cl. 5 and 9		N
	Sample 1 burning time (s) .... :		--
	Sample 2 burning time (s) .... :		--
	Sample 3 burning time (s) .... :		--
A.3	Hot flaming oil test (see 4.6.2)		--
A.3.1	Mounting of samples		N
A.3.2	Test procedure		N
A.3.3	Compliance criterion		N

B	ANNEX B, MOTOR TESTS UNDER ABNORMAL CONDITIONS (see 4.7.2.2 and 5.3.2)		N
B.1	General requirements		N
	Position .... :		--
	Manufacturer .... :		--
	Type .... :		--
	Rated values .... :		--
B.2	Test conditions		N
B.3	Maximum temperatures		N
B.4	Running overload test		N
B.5	Locked-rotor overload test		N
	Test duration (days) .... :		--
	Electric strength test: test voltage (V) .... :		--

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Clause	Requirement + Test	Result - Remark	Verdict
B.6	Running overload test for d.c. motors in secondary circuits		N
B.6.1	General		N
B.6.2	Test procedure		N
B.6.3	Alternative test procedure		N
B.6.4	Electric strength test; test voltage (V) .... :		N
B.7	Locked-rotor overload test for d.c. motors in secondary circuits		N
B.7.1	General		N
B.7.2	Test procedure		N
B.7.3	Alternative test procedure		N
B.7.4	Electric strength test; test voltage (V) ....:		N
B.8	Test for motors with capacitors		N
B.9	Test for three-phase motors		N
B.10	Test for series motors		N
	Operating voltage (V) .... :		N
C	ANNEX C, TRANSFORMERS (see 1.5.4 and 5.3.3)		P
	Position .... :	Main transformer, current transformer CT1	--
	Manufacturer .... :	(see appended table 1.5.1)	--
	Type .... :	(see appended table 1.5.1)	--
	Rated values .... :	(see appended table 1.5.1)	--
	Method of protection.. :	Protection by electronic circuits and software controls.	--
C.1	Overload test	(see appended table 5.3)	P
C.2	Insulation	(see appended table 5.2)	P
	Protection from displacement of windings :		P
D	ANNEX D, MEASURING INSTRUMENTS FOR TOUCH-CURRENT TESTS (see 5.1.4)		P
D.1	Measuring instrument	As in figure D1 used.	P
D.2	Alternative measuring instrument	Not used.	N
E	ANNEX E, TEMPERATURE RISE OF A WINDING (see 1.4.13) *Thermocouple method used*		P
F	ANNEX F, MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES (see 2.10 and Annex G)		P

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Clause	Requirement + Test	Result - Remark	Verdict

G	ANNEX G, ALTERNATIVE METHOD FOR DETERMINING MINIMUM CLEARANCES		N
G.1	Clearances		N
G.1.1	General		N
G.1.2	Summary of the procedure for determining minimum clearances		N
G.2	Determination of mains transient voltage (V)		N
G.2.1	AC mains supply .... :		N
G.2.2	Earthed d.c. mains supplies .... :		N
G.2.3	Unearthed d.c. mains supplies .... :		N
G.2.4	Battery operation .... :		N
G.3	Determination of telecommunication network transient voltage (V) .... :		N
G.4	Determination of required withstand voltage (V)		N
G.4.1	Mains transients and internal repetitive peaks .... :		N
G.4.2	Transients from telecommunication networks ..... :		N
G.4.3	Combination of transients		N
G.4.4	Transients from cable distribution systems		N
G.5	Measurement of transient voltages (V)		N
	a) Transients from a mains supply		--
	For an a.c. mains supply		--
	For a d.c. mains supply		--
	b) Transients from a telecommunication network		--
G.6	Determination of minimum clearances .... :		N

H	ANNEX H, IONIZING RADIATION (see 4.3.13)		N

J	ANNEX J, TABLE OF ELECTROCHEMICAL POTENTIALS (see 2.6.5.6)		N
	Metal(s) used :		--

K	ANNEX K, THERMAL CONTROLS (see 1.5.3 and 5.3.8)		N
K.1	Making and breaking capacity		N
K.2	Thermostat reliability; operating voltage (V) .... :		N
K.3	Thermostat endurance test; operating voltage (V) .... :		N
K.4	Temperature limiter endurance; operating voltage (V) .... :		N

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Clause	Requirement + Test	Result - Remark	Verdict
K.5	Thermal cut-out reliability		N
K.6	Stability of operation		N
L	ANNEX L, NORMAL LOAD CONDITIONS FOR SOME TYPES OF ELECTRICAL BUSINESS EQUIPMENT (see 1.2.2.1 and 4.5.2)		N
L.1	Typewriters		N
L.2	Adding machines and cash registers		N
L.3	Erasers		N
L.4	Pencil sharpeners		N
L.5	Duplicators and copy machines		N
L.6	Motor-operated files		N
L.7	Other business equipment		N
M	ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1)		N
M.1	Introduction		N
M.2	Method A		N
M.3	Method B		N
M.3.1	Ringing signal		N
M.3.1.1	Frequency (Hz) .... :		N
M.3.1.2	Voltage (V) .... :		N
M.3.1.3	Cadence; time (s), voltage (V) .... :		N
M.3.1.4	Single fault current (mA) .... :		N
M.3.2	Tripping device and monitoring voltage .... :		N
M.3.2.1	Conditions for use of a tripping device or a monitoring voltage		N
M.3.2.2	Tripping device		N
M.3.2.3	Monitoring voltage (V) .... :		N
N	ANNEX N, IMPULSE TEST GENERATORS (see 1.5.7.2, 1.5.7.3, 2.10.3.9, 6.2.2.1, 7.3.2, 7.4.3 and Clause G.5)		N
N.1	ITU-T impulse test generators		N
N.2	IEC 60065 impulse test generator		N
Q	ANNEX Q, Voltage dependent resistors (VDRs) (see 1.5.9.1)		N
	a) Preferred climatic categories .... :		N
	b) Maximum continuous voltage .... :		N
	c) Pulse current .... :		N

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Clause	Requirement + Test	Result - Remark	Verdict
R	ANNEX R, EXAMPLES OF REQUIREMENTS FOR QUALITY CONTROL PROGRAMMES		N
R.1	Minimum separation distances for unpopulated coated printed boards (see 2.10.6.2)		N
R.2	Reduced clearances (see 2.10.3)		N
S	ANNEX S, PROCEDURE FOR IMPULSE TESTING (see 6.2.2.3)		N
S.1	Test equipment		N
S.2	Test procedure		N
S.3	Examples of waveforms during impulse testing		N
T	ANNEX T, GUIDANCE ON PROTECTION AGAINST INGRESS OF WATER (see 1.1.2)		N
			--
U	ANNEX U, INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION (see 2.10.5.4)		N
			--
V	ANNEX V, AC POWER DISTRIBUTION SYSTEMS (see 1.6.1)		P
V.1	Introduction		P
V.2	TN power distribution systems		P
W	ANNEX W, SUMMATION OF TOUCH CURRENTS		N
W.1	Touch current from electronic circuits		N
W.1.1	Floating circuits		N
W.1.2	Earthed circuits		N
W.2	Interconnection of several equipments		N
W.2.1	Isolation		N
W.2.2	Common return, isolated from earth		N
W.2.3	Common return, connected to protective earth		N
X	ANNEX X, MAXIMUM HEATING EFFECT IN TRANSFORMER TESTS (see clause C.1)		P
X.1	Determination of maximum input current		P
X.2	Overload test procedure		P
Y	ANNEX Y, ULTRAVIOLET LIGHT CONDITIONING TEST (see 4.3.13.3)		N
Y.1	Test apparatus .... :	No ultraviolet light.	N

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Clause	Requirement + Test	Result - Remark	Verdict
Y.2	Mounting of test samples .... :		N
Y.3	Carbon-arc light-exposure apparatus .... :		N
Y.4	Xenon-arc light exposure apparatus .... :		N

Z	ANNEX Z, OVERVOLTAGE CATEGORIES (see 2.10.3.2 and Clause G.2)	N

AA	ANNEX AA, MANDREL TEST (see 2.10.5.8)	N

BB	ANNEX BB, CHANGES IN THE SECOND EDITION	P
EN 60950-1:2006 – COMMON MODIFICATIONS		
Contents	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZC (informative) A-deviations	--
General	Delete all the “country” notes in the reference document according to the following list: 1.4.8 Note 2; 1.5.1 Note 2 & 3; 1.5.7.1 Note 1.5.8 Note 2; 1.5.9.4 Note; 1.7.2.1 Note 4, 5 & 6 2.2.3 Note; 2.2.4 Note; 2.3.2 Note 2.3.2.1 Note 2; 2.3.4 Note 2; 2.6.3.3 Note 2 & 3 2.7.1 Note; 2.10.3.2 Note 2; 2.10.5.13 Note 3 3.2.1.1 Note; 3.2.4 Note 3.; 2.5.1 Note 2 4.3.6 Note 1 & 2; 4.7 Note 4; 4.7.2.2 Note 4.7.3.1 Note 2; 5.1.7.1 Note 3 & 4; 5.3.7 Note 1 6 Note 2 & 5; 6.1.2.1 Note 2; 6.1.2.2 Note 6.2.2 Note 6.; 2.2.1 Note 2; 6.2.2.2 Note 7.1 Note 3; 7.2 Note; 7.3 Note 1 & 2 G.2.1 Note 2; Annex H Note 2	--
1.3.Z1	Add the following subclause: 1.3.Z1 Exposure to excessive sound pressure The apparatus shall be so designed and constructed as to present no danger when used for its intended purpose, either in normal operating conditions or under fault conditions, particularly providing protection against exposure to excessive sound pressures from headphones or earphones. NOTE Z1 A new method of measurement is described in EN 50332-1, Sound system equipment: Headphones and earphones associated with portable audio equipment - Maximum sound pressure level measurement methodology and limit considerations - Part 1: General method for “one package equipment”, and in EN 50332-2, Sound system equipment: Headphones and earphones associated with portable audio equipment - Maximum sound pressure level measurement methodology and limit considerations - Part 2: Guidelines to associate sets with headphones coming from different manufacturers.	N

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Clause	Requirement + Test	Result - Remark	Verdict
1.5.1	Add the following NOTE: NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2002/95/EC		P
1.7.2.1	Add the following NOTE: NOTE Z1 In addition, the instructions shall include, as far as applicable, a warning that excessive sound pressure from earphones and headphones can cause hearing loss		N
2.7.1	Replace the subclause as follows: Basic requirements To protect against excessive current, short-circuits and earth faults in PRIMARY CIRCUITS, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c): a) except as detailed in b) and c), protective devices necessary to comply with the requirements of 5.3 shall be included as parts of the equipment; b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation; c) it is permitted for PLUGGABLE EQUIPMENT TYPE B or PERMANENTLY CONNECTED EQUIPMENT, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions. If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for PLUGGABLE EQUIPMENT TYPE A the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.		P
2.7.2	This subclause has been declared ‘void’.		--
3.2.3	Delete the NOTE in Table 3A, and delete also in this table the conduit sizes in parentheses.		--
3.2.5.1	Replace “60245 IEC 53” by “H05 RR-F”; “60227 IEC 52” by “H03 VV-F or H03 VVH2-F”; “60227 IEC 53” by “H05 VV-F or H05 VVH2-F2”. In Table 3B, replace the first four lines by the following: | Up to and including 6 | 0,75 [a)] | | Over 6 up to and including 10 | (0,75) [b)] 1,0 | | Over 10 up to and including 16 | (1,0) [c)] 1,5 | In the conditions applicable to Table 3B delete the words “in some countries” in condition [a)]. In NOTE 1, applicable to Table 3B, delete the second sentence.		N
3.3.4	In Table 3D, delete the fourth line: conductor sizes for 10 to 13 A, and replace with the following: | Over 10 up to and including 16 | 1,5 to 2,5 | 1,5 to 4 | Delete the fifth line: conductor sizes for 13 to 16 A.		N

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Clause	Requirement + Test	Result - Remark	Verdict
4.3.13.6	Add the following NOTE: NOTE Z1 Attention is drawn to 1999/519/EC: Council Recommendation on the limitation of exposure of the general public to electromagnetic fields 0 Hz to 300 GHz. Standards taking into account this Recommendation which demonstrate compliance with the applicable EU Directive are indicated in the OJEC.		--
Annex H	Replace the last paragraph of this annex by: At any point 10 cm from the surface of the OPERATOR ACCESS AREA, the dose rate shall not exceed 1 μSv/h (0,1 mR/h) (see NOTE). Account is taken of the background level. Replace the notes as follows: NOTE These values appear in Directive 96/29/Euratom. Delete NOTE 2.		N
Biblio-graphy	Additional EN standards.		--
ZA	NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS		N
ZB	SPECIAL NATIONAL CONDITIONS		N
1.2.4.1	In **Denmark**, certain types of Class I appliances (see 3.2.1.1) may be provided with a plug not establishing earthing conditions when inserted into Danish socket-outlets.		N
1.2.13.14	In **Norway** and **Sweden**, for requirements see 1.7.2.1 and 7.3 of this annex.		N
1.5.7.1	In **Finland, Norway** and **Sweden**, resistors bridging BASIC INSULATION in CLASS I PLUGGABLE EQUIPMENT TYPE A must comply with the requirements in 1.5.7.1. In addition when a single resistor is used, the resistor must withstand the resistor test in 1.5.7.2.		N
1.5.8	In **Norway**, due to the IT power system used (see annex V, Figure V.7), capacitors are required to be rated for the applicable line-to-line voltage (230 V).		N
1.5.9.4	In **Finland**, **Norway** and **Sweden**, the third dashed sentence is applicable only to equipment as defined in 6.1.2.2 of this annex.		P

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Clause	Requirement + Test	Result - Remark	Verdict
1.7.2.1	In **Finland**, **Norway** and **Sweden**, CLASS I PLUGGABLE EQUIPMENT TYPE A intended for connection to other equipment or a network shall, if safety relies on connection to protective earth or if surge suppressors are connected between the network terminals and accessible parts, have a marking stating that the equipment must be connected to an earthed mains socket-outlet. The marking text in the applicable countries shall be as follows: In Finland: "Laite on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan" In Norway: "Apparatet må tilkoples jordet stikkontakt" In Sweden: "Apparaten skall anslutas till jordat uttag" In **Norway** and **Sweden**, the screen of the cable distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation need to be isolated from the screen of a cable distribution system. It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by e.g. a retailer. The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in: "Equipment connected to the protective earthing of the building installation through the mains connection or through other equipment with a connection to protective earthing – and to a cable distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a cable distribution system has therefore to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11)." NOTE In Norway, due to regulation for installations of cable distribution systems, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min. Translation to Norwegian (the Swedish text will also be accepted in Norway): "Utstyr som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av utstyret til kabel-TV nettet installeres en galvanisk isolator mellom utstyret og kabel- TV nettet." Translation to Swedish: "Utrustning som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medfőra risk főr brand. Főr att undvika detta skall vid anslutning av utrustningen till kabel-TV nät galvanisk isolator finnas mellan utrustningen och kabel-TV nätet."		
1.7.5	In **Denmark**, socket-outlets for providing power to other equipment shall be in accordance with the Heavy Current Regulations, Section 107-2-D1, Standard Sheet DK 1-3a, DK 1-5a or DK 1-7a, when used on Class I equipment. For STATIONARY EQUIPMENT the socket-outlet shall be in accordance with Standard Sheet DK 1-1b or DK 1-5a. For CLASS II EQUIPMENT the socket outlet shall be in accordance with Standard Sheet DKA 1-4a.		N
2.2.4	In **Norway**, for requirements see 1.7.2.1, 6.1.2.1 and 6.1.2.2 of this annex.		N
2.3.2	In **Finland**, **Norway** and **Sweden** there are additional requirements for the insulation. See 6.1.2.1 and 6.1.2.2 of this annex.		N

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Clause	Requirement + Test	Result - Remark	Verdict
2.3.4	In **Norway**, for requirements see 1.7.2.1, 6.1.2.1 and 6.1.2.2 of this annex.		N
2.6.3.3	In the **United Kingdom**, the current rating of the circuit shall be taken as 13 A, not 16 A.		N
2.7.1	In the **United Kingdom**, to protect against excessive currents and short-circuits in the PRIMARY CIRCUIT of DIRECT PLUG-IN EQUIPMENT, tests according to 5.3 shall be conducted, using an external protective device rated 30 A or 32 A. If these tests fail, suitable protective devices shall be included as integral parts of the DIRECT PLUG-IN EQUIPMENT, so that the requirements of 5.3 are met.		N
2.10.5.13	In **Finland**, **Norway** and **Sweden**, there are additional requirements for the insulation, see 6.1.2.1 and 6.1.2.2 of this annex.		N
3.2.1.1	In **Switzerland**, supply cords of equipment having a RATED CURRENT not exceeding 10 A shall be provided with a plug complying with SEV 1011 or IEC 60884-1 and one of the following dimension sheets: SEV 6532-2.1991 Plug Type 15 3P+N+PE 250/400 V, 10 A SEV 6533-2.1991 Plug Type 11 L+N 250 V, 10 A SEV 6534-2.1991 Plug Type 12 L+N+PE 250 V, 10 A In general, EN 60309 applies for plugs for currents exceeding 10 A. However, a 16 A plug and socket-outlet system is being introduced in Switzerland, the plugs of which are according to the following dimension sheets, published in February 1998: SEV 5932-2.1998 Plug Type 25 3L+N+PE 230/400 V, 16 A SEV 5933-2.1998 Plug Type 21 L+N 250 V, 16 A SEV 5934-2.1998 Plug Type 23 L+N+PE 250 V, 16 A		N
3.2.1.1	In **Denmark**, supply cords of single-phase equipment having a rated current not exceeding13 A shall be provided with a plug according to the Heavy Current Regulations, Section 107-2-D1. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If poly-phase equipment and single-phase equipment having a RATED CURRENT exceeding 13 A is provided with a supply cord with a plug, this plug shall be in accordance with the Heavy Current Regulations, Section 107-2-D1 or EN 60309-2.		N
3.2.1.1	In **Spain**, supply cords of single-phase equipment having a rated current not exceeding 10 A shall be provided with a plug according to UNE 20315:1994. Supply cords of single-phase equipment having a rated current not exceeding 2,5 A shall be provided with a plug according to UNE-EN 50075:1993. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules, shall be provided with a plug in accordance with standard UNE 20315:1994. If poly-phase equipment is provided with a supply cord with a plug, this plug shall be in accordance with UNE-EN 60309-2.		--

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Clause	Requirement + Test	Result - Remark	Verdict
3.2.1.1	In the **United Kingdom**, apparatus which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord and plug, shall be fitted with a ‘standard plug’ in accordance with Statutory Instrument 1768:1994 - The Plugs and Sockets etc. (Safety) Regulations 1994, unless exempted by those regulations. NOTE ‘Standard plug’ is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.		--
3.2.1.1	In **Ireland**, apparatus which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to I.S. 411 by means of that flexible cable or cord and plug, shall be fitted with a 13 A plug in accordance with Statutory Instrument 525:1997 - National Standards Authority of Ireland (section 28) (13 A Plugs and Conversion Adaptors for Domestic Use) Regulations 1997.		N
3.2.4	In **Switzerland**, for requirements see 3.2.1.1 of this annex.		N
3.2.5.1	In the **United Kingdom**, a power supply cord with conductor of 1,25 mm2 is allowed for equipment with a rated current over 10 A and up to and including 13 A.		N
3.3.4	In the **United Kingdom**, the range of conductor sizes of flexible cords to be accepted by terminals for equipment with a RATED CURRENT of over 10 A up to and including 13 A is: • 1,25 mm^2 to 1,5 mm^2 nominal cross-sectional area.		N
4.3.6	In the **United Kingdom**, the torque test is performed using a socket outlet complying with BS 1363 part 1:1995, including Amendment 1:1997 and Amendment 2:2003 and the plug part of DIRECT PLUG-IN EQUIPMENT shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16 and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.		N
4.3.6	In **Ireland**, DIRECT PLUG-IN EQUIPMENT is known as plug similar devices. Such devices shall comply with Statutory Instrument 526:1997 - National Standards Authority of Ireland (Section 28) (Electrical plugs, plug similar devices and sockets for domestic use) Regulations, 1997.		N
5.1.7.1	In **Finland**, **Norway** and **Sweden** TOUCH CURRENT measurement results exceeding 3,5 mA r.m.s. are permitted only for the following equipment: • STATIONARY PLUGGABLE EQUIPMENT TYPE A that ○ is intended to be used in a RESTRICTED ACCESS LOCATION where equipotential bonding has been applied, for example, in a telecommunication centre; and ○ has provision for a permanently connected PROTECTIVE EARTHING CONDUCTOR; and ○ is provided with instructions for the installation of that conductor by a SERVICE PERSON; • STATIONARY PLUGGABLE EQUIPMENT TYPE B; • STATIONARY PERMANENTLY CONNECTED EQUIPMENT.		N

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Clause	Requirement + Test	Result - Remark	Verdict
6.1.2.1	In **Finland**, **Norway** and **Sweden**, add the following text between the first and second paragraph of the compliance clause: If this insulation is solid, including insulation forming part of a component, it shall at least consist of either - two layers of thin sheet material, each of which shall pass the electric strength test below, or - one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below. If this insulation forms part of a semiconductor component (e.g. an optocoupler), there is no distance through insulation requirement for the insulation consisting of an insulating compound completely filling the casing, so that CLEARANCES and CREEPAGE DISTANCES do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition - passes the tests and inspection criteria of 2.10.11 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 2.10.10 shall be performed using 1,5 kV), and - is subject to ROUTINE TESTING for electric strength during manufacturing, using a test voltage of 1,5 kV. It is permitted to bridge this insulation with a capacitor complying with EN 132400:1994, subclass Y2. A capacitor classified Y3 according to EN 132400:1994, may bridge this insulation under the following conditions: - the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 132400, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in EN 60950-1:2006, 6.2.2.1; - the additional testing shall be performed on all the test specimens as described in EN 132400; - the impulse test of 2,5 kV is to be performed before the endurance test in EN 132400, in the sequence of tests as described in EN 132400.		N
6.1.2.2	In **Finland**, **Norway** and **Sweden**, the exclusions are applicable for PERMANENTLY CONNECTED EQUIPMENT, PLUGGABLE EQUIPMENT TYPE B and equipment intended to be used in a RESTRICTED ACCESS LOCATION where equipotential bonding has been applied, e.g. in a telecommunication centre, and which has provision for a permanently connected PROTECTIVE EARTHING CONDUCTOR and is provided with instructions for the installation of that conductor by a SERVICE PERSON.		N
7.2	In **Finland**, **Norway** and **Sweden**, for requirements see 6.1.2.1 and 6.1.2.2 of this annex. The term TELECOMMUNICATION NETWORK in 6.1.2 being replaced by the term CABLE DISTRIBUTION SYSTEM.		N
7.3	In **Norway** and **Sweden**, for requirements see 1.2.13.14 and 1.7.2.1 of this annex.		N
7.3	In **Norway**, for installation conditions see EN 60728-11:2005.		N
ZC	A-DEVIATIONS (informative)		P

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.5.1	**Sweden** (Ordinance 1990:944) Add the following: NOTE In Sweden, switches containing mercury are not permitted.		P
1.5.1	**Switzerland** (Ordinance on environmentally hazardous substances SR 814.081, Annex 1.7, Mercury - Annex 1.7 of SR 814.81 applies for mercury.) Add the following: NOTE In Switzerland, switches containing mercury such as thermostats, relays and level controllers are not allowed.		P
1.7.2.1	**Denmark** (Heavy Current Regulations) Supply cords of CLASS I EQUIPMENT, which is delivered without a plug, must be provided with a visible tag with the following text: Vigtigt! Lederen med grøn/gul isolation må kun tilsluttes en klemme mærket  eller  If essential for the safety of the equipment, the tag must in addition be provided with a diagram, which shows the connection of the other conductors, or be provided with the following text: "For tilslutning af de øvrige ledere, se medfølgende installationsvejledning."		N
1.7.2.1	**Germany** (Gesetz über technische Arbeitsmittel und Verbraucherprodukte (Geräte- und Produktsicherheitsgesetz – GPSG) [Law on technical labour equipment and consumer products], of 6th January 2004, Section 2, Article 4, Clause (4), Item 2). If for the assurance of safety and health certain rules during use, amending or maintenance of a technical labour equipment or readymade consumer product are to be followed, a manual in German language has to be delivered when placing the product on the market. Of this requirement, rules for use even only by SERVICE PERSONS are not exempted.		P
1.7.5	**Denmark** (Heavy Current Regulations) With the exception of CLASS II EQUIPMENT provided with a socket outlet in accordance with the Heavy Current Regulations, Section 107-2-D1, Standard Sheet DK 1-4a, CLASS II EQUIPMENT shall not be fitted with socket-outlets for providing power to other equipment.		N
1.7.13	**Switzerland** (Ordinance on chemical hazardous risk reduction SR 814.81, Annex 2.15 Batteries) Annex 2.15 of SR 814.81 applies for batteries.		N
5.1.7.1	**Denmark** (Heavy Current Regulations, Chapter 707, clause 707.4) TOUCH CURRENT measurement results exceeding 3,5 mA r.m.s. are permitted only for PERMANENTLY CONNECTED EQUIPMENT and PLUGGABLE EQUIPMENT TYPE B.		N

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Clause	Requirement + Test	Result - Remark	Verdict

1.5.1	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity[1])
Top panel	CHIMEI	PA765A	V-0, Min 80℃, Min thickness 2.1mm	UL94	UL E56070
(Alternate)	LG	AF312C	V-0, Min 70℃, Min thickness 2.5mm	UL94	UL E67171
Metal enclosure	--	Painted steel	Min 1.5 mm thickness	--	--
Main transformer (for model APC1012E)	CSCCN	080-49881-00	Class B	--	Tested with equipment
Main transformer (for model APC1512E)	CSCCN	080-49881-00	Class B	--	Tested with equipment
Main transformer (for model APC2012E)	CSCCN	080-49883-00	Class H	--	Tested with equipment
Main transformer (for model APC3012E)	CSCCN	080-49901-00	Class H	--	Tested with equipment
Current transformer (CT1)	Click	080-20338-00	Class B	--	Tested with equipment
Transformer (TX06)	Click	080-49851-00A	Class B	--	Tested with equipment
Terminal block	GOSUN	GSS500	--	--	Tested with equipment
Input G, L and n wire	Various	1015	12AWG, 105	--	UL
Input/output breaker	KUOYUH	98 Series	125/250VAC 50/60Hz, 30A	--	TUV, UL
DC Fan	JAMICON, Kaimei electronic corp.	JF0925H1UMAR	12V, 0.42A	--	TUV, UL
Capacitor (C17, C20, for model APC1012E, APC1512E)	Various	Various	X2 type, 2.2uF, 275Vac	IEC 60384-14	VDE

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Clause	Requirement + Test	Result - Remark	Verdict

Capacitor (C17, C20, C32, for model APC2012E, APC3012E)	Various	Various	X2 type, 2.2uF, 275Vac	IEC 60384-14	VDE
Choke (L2)	Click	082-10205-00	130℃	--	Tested with equipment
Capacitor (C9, C10, C30, C34 for model APC1012E, APC1512E)	Various	Various	Y2 type, 10000pF, 250Vac	IEC 60384-14	VDE
Capacitor (C9, C10, C18, C19, C30, C34 for model APC2012E, APC3012E)	Various	Various	Y2 type, 10000pF, 250Vac	IEC 60384-14	VDE
Relay (RY01)	SONG CHUAN	855AP-1A-C	250V, 30A, Coil 12V	--	TUV, UL
PCB	Various	Various	V-0, 130℃	--	UL
Switch	Zhang Jia Gang Hua Feng Electronic Connector & Component Co. Ltd.	HF-606	250V, 6A	VDE 0630	VDE, CSA, UL
[1]) An asterisk indicates a mark which assures the agreed level of surveillance					
Supplementary information:					

1.6.2	TABLE: Electrical data (in normal conditions)					P
U (V)	I (A)	Irated (A)	P (W)	Fuse #	Ifuse (A)	Condition/status
Tested on model APC3012E						
198V/ 50Hz	15.7	--	3146	Breaker	--	Charging of empty batteries and rated output load.
220 V/ 50Hz	14.1	30	3143	Breaker	--	Charging of empty batteries and rated output load.
240 V/ 50Hz	12.7	30	3135	Breaker	--	Charging of empty batteries and rated output load.
264 V/ 50Hz	11.6	--	3130	Breaker	--	Charging of empty batteries and rated output load.
198V/ 60Hz	15.6	--	3165	Breaker	--	Charging of empty batteries and rated output load.
220 V/ 60Hz	14.1	30	3125	Breaker	--	Charging of empty batteries and rated output load.

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Clause	Requirement + Test	Result - Remark	Verdict

240 V/ 60Hz	12.8	30	3122	Breaker	--	Charging of empty batteries and rated output load.
264 V/ 60Hz	12.2	--	3114	Breaker	--	Charging of empty batteries and rated output load.
Tested on model APC2012E						
198V/ 50Hz	11.2	--	2161	Breaker	--	Charging of empty batteries and rated output load.
220 V/ 50Hz	10.0	10	2182	Breaker	--	Charging of empty batteries and rated output load.
240 V/ 50Hz	9.1	--	2174	Breaker	--	Charging of empty batteries and rated output load.
264 V/ 50Hz	8.8	--	2166	Breaker	--	Charging of empty batteries and rated output load.
198V/ 60Hz	11.1	--	2168	Breaker	--	Charging of empty batteries and rated output load.
220 V/ 60Hz	10.0	10	2170	Breaker	--	Charging of empty batteries and rated output load.
240 V/ 60Hz	9.1	--	2167	Breaker	--	Charging of empty batteries and rated output load.
264 V/ 60Hz	8.7	--	2161	Breaker	--	Charging of empty batteries and rated output load.
Supplementary information:						

1.7.11	TABLE: durability of marking test		P
Location	Checked by	Times	Result
External enclosure	Water	15s	No any curling and still legibility
External enclosure	Petroleum spirit	15s	No any curling and still legibility
Supplementary information:			

2.1.1.5 c1)	TABLE: max. V, A, VA test (Energy hazardous measurement)			N
Voltage (rated) (V)	Current (rated) (A)	Voltage (max.) (V)	Current (max.) (A)	VA (max.) (VA)
Supplementary information: Battery terminal				

2.1.1.5 c2)	TABLE: stored energy (Energy hazardous measurement)	N
Capacitance C (µF)	Voltage U (V)	Energy E (J)

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:		

2.1.1.7	TABLE: Capacitance discharge test		P
Condition	τ calculated (s)	τ measured (s)	Comments
L-N	--	3.2ms	Vp=360V, 37%Vp=133.2V
Supplementary information: Supplied with 264V/50Hz, test without load. Tested on model APC3012E			

2.2	TABLE: evaluation of voltage limiting components in SELV circuits		P
Component (measured between)	max. voltage (V) (normal operation)		Voltage Limiting Components
	V peak	V d.c.	
Charger winding of main transformer	26.7V	--	--
Secondary winding of current transfomrer CT1	8.6V	--	--
Fault test performed on voltage limiting components	Voltage measured (V) in SELV circuits (V peak or V d.c.)		
Charger winding of main transformer, s-c	0V		
Secondary winding of current transfomrer CT1, s-c	0V		
Supplementary information: S-c=Short circuit. Tested on model APC3012E			

2.4.2	TABLE: Limited current circuit measurement				P
Location : L-N of input					
Condition	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments
Normal	2.36V	1.18	48.5	33.95	A 2000 ohm non-inductive resistor used for Frequency > 1kHz, Annex D used for 60Hz
Q04 c-e shorted	2.4V	1.2	48.5	33.95	Ditto
Location : L-G of input					
Condition	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments

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Clause	Requirement + Test	Result - Remark	Verdict

Normal	5.5	2.75	50	35	A 2000 ohm non-inductive resistor used for Frequency > 1kHz, Annex D used for 60Hz
Q04	5.0	2.5	50	35	Ditto
Location : N-G of input					
Condition	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments
Normal	7.28	3.64	50	35	A 2000 ohm non-inductive resistor used for Frequency > 1kHz, Annex D used for 60Hz
Q04 c-e shorted	7.4	3.7	50	35	Ditto
Supplementary information: Supplied with 264V/50Hz. Tested on model PSW7 6024E					

2.5	TABLE: limited power sources				N
Circuit output tested:					
Measured Uoc (V) with all load circuits disconnected: Uoc=					
Measuring position	I_{sc}(A)		VA		
	Meas.	Limit	Meas.	Limit	
Supplementary information: S-c=Short circuit, O-c=Open circuit					

2.6.3.4	TABLE: ground continue test				P
Location	Resistance measured (mΩ)	Voltage measured (V)	Current applied (A)	Duration (min)	
G pin of Inlet to earthing enclosure	27	1.62	60	4	
Supplementary information: Tested on model APC3012E					

2.10.2	TABLE: determination of operating voltage measurement				N
Component	Location		Peak Voltage (Vac)	RMS Voltage (Vac)	Comments
	From	To			
Supplementary information:					

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict

2.10.3 and 2.10.4	TABLE: Clearance and creepage distance measurements					P
Clearance (cl) and creepage distance (cr) at/of/between:	U peak (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)
Line and neutral trace under C17	<420	<250	2.0	6.2	2.5	6.2
Line and neutral trace under C20	<420	<250	2.0	6.5	2.5	6.5
Primary trace to earthed trace	<420	<250	2.0	>2.5	2.5	>2.5
Primary component to chassis	<420	<250	2.0	>5	2.5	>5
Primary trace to secondary trace under CT1	<420	<250	4.0	8.3	5.0	8.3
Primary trace to secondary trace under RY1	<420	<250	4.0	8.4	5.0	8.4
Coil to contacts of RY1 for reinforce insulation	<420	<250	4.0	>5.0	5.0	>5.0
Supplementary information: 1. See appended table C.2 for internal distances of transformer. 2. 10 N Test performed component and internal wire.						

2.10.5	TABLE: Distance through insulation measurements				P
Distance through insulation (DTI) at/of:	U peak (V)	U rms (V)	Test voltage (V)	Required DTI (mm)	DTI (mm)
Relay enclosure (reinforced insulation)	<420	<250	3000	0.4	≥0.4 1)
CT1 tube(reinforced insulation)	<420	<250	3000	0.4	≥0.4 1)
Supplementary information: 1) Approved component. For details refer to CDF					

4.3.8	TABLE: Batteries										N
The tests of 4.3.8 are applicable only when appropriate battery data is not available											N
Is it possible to install the battery in a reverse polarity position?											N
	Non-rechargeable batteries			Rechargeable batteries							
	Discharging		Un-intentional charging	Charging		Discharging		Reversed charging			
	Meas. current	Manuf. Specs.		Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.		

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Clause	Requirement + Test	Result - Remark	Verdict

Max. current during normal condition	--	--	--	--	--	--	--	--	--
Max. current during fault condition	--	--	--	--	--	--	--	--	--

Test results:		Verdict
- Chemical leaks		N
- Explosion of the battery		N
- Emission of flame or expulsion of molten metal		N
- Electric strength tests of equipment after completion of tests		N
Supplementary information:		

4.5	TABLE: Thermal requirements						P
	Supply voltage (V) ……………….:	198V/ 60Hz	264V/ 50Hz	Dis-charge mode	--	--	–
	Ambient T_{min}(°C) ……………….:	--	--	--	--	--	–
	Ambient T_{max}(°C) ……………….:	--	--	--	--	--	–
Maximum measured temperature T of part/at:		T (°C)					Allowed T_{max} (°C)
Tested on model APC3012E							
Input terminal block		39.3	37.7	86.1	--	--	105
Battery terminal		32.5	31.9	46.6	--	--	105
Input breaker		49.9	48.5	49.7	--	--	85
Input “L” wire		47.2	46.1	44.2	--	--	105
Battery wire (red)		45.9	44.4	42.1	--	--	105
Top panel		36.0	35.5	53.0	--	--	95
Top metal enclosure		39.0	39.4	38.0	--	--	75
RY01 coil		83.7	81.6	47.2	--	--	130
L2 coil		46.6	45.3	42.5	--	--	130
Y2-Capacitor C19		46.6	45.2	41.3	--	--	85
X2-Capacitor C20		49.3	49.3	40.9	--	--	100
TX06 winding		56.1	56.1	45.9	--	--	110
CT1 winding		66.0	64.7	48.5	--	--	110

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict

PCB near Q2	46.6	45.8	65.0	--	--	130
Y2-Capacitor C9	33.4	34.1	45.8	--	--	85
Y2-Capacitor C10	38.2	37.0	54.8	--	--	85
PCB near Q5	54.5	53.8	70.7	--	--	130
The primary winding of main transformer	74.9	73.6	78.4	--	--	130
The secondary winding of main transformer	74.4	73.5	83.0	--	--	130
The core of main transformer	69.4	68.5	69.2	--	--	--
Ambient	22.0	23.2	23.6	--	--	--
Supplementary information:						

Temperature T of winding:	t_1 (°C)	R_1 (Ω)	t_2 (°C)	R_2 (Ω)	T (°C)	Allowed T_{max} (°C)	Insulation class

Supplementary information:

1) T shall not exceed (Tmax + Tamb – Tma), see clause 1.4.12.

   T: is the temperature of the given part measured under the prescribed test conditions;

   Tmax: is the maxnmum temperature specified for compliance with the test;

   Tamb: is the ambient temperature during test;

   Tma: is the maximum ambient temperature during permitted by the manufacturer's specification, see below 2).

2) The maximum ambient temperature is 40℃.

4.5.5	TABLE: Ball pressure test of thermoplastic parts		P
	Allowed impression diameter (mm) .... :	≤ 2 mm	–

Part	Test temperature (°C)	Impression diameter (mm)
CT1 Bobbin	125	0.8
Input terminal block	125	0.8
Battery terminal	125	1.2
Supplementary information:		

4.7	TABLE: Resistance to fire				P
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class	Evidence
Top panel					
Supplementary information:					

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict

4.6.1 and 4.6.2	TABLE: openings		P
Location	Size (mm)	Comments	
Top	None	No openings	
Bottom	None	No openings	
Side	2.9mm Max.	960 provided	
Front	None	No openings	
Back	--	Only DC fan ventilation openings provided on back. Metal net provide as fan guard.	
Supplementary information:			

5.1.6	TABLE: touch current measurement			P
Measured between:	Measured (mA)	Limit (mA)	Comments/conditions	
Live – Enclosure	1.9	3.5	Normal load condition.	
Neutral – Enclosure	1.9	3.5	Normal load condition.	
Live – secondary circuit	0.07	0.25	Normal load condition.	
Neutral –secondary circuit	0.06	0.25	Normal load condition.	
supplementary information: Vin =264V, Tested on model APC3012E				

5.2	TABLE: Electric strength tests, impulse tests and voltage surge tests			P
Test voltage applied between:	Voltage shape (AC, DC, impulse, surge)	Test voltage (V)	Breakdown Yes/No	
Primary circuit and secondary circuit	AC	3000	No	
Primary circuit and enclosure	AC	1500	No	
Primary winding and secondary winding of main tranformer	AC	3000	No	
Primary winding and core of main tranformer	AC	1500	No	
Primary winding and secondary winding of CT1	AC	3000	No	
Primary winding and core of CT1	AC	3000	No	
2 layers insulating tape used in CT1 transformer	AC	3000	No	
1 layers insulating tape used in main transformer	AC	3000	No	
Supplementary information:				

5.3	TABLE: Fault condition tests		P
	Ambient temperature (°C) ……………………………:	25, if not specify.	–

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Power source for EUT: Manufacturer, model/type, output rating ……………………………………………:	APC3012E, Refer to page 2.	–

Component No.	Fault	Supply voltage (V)	Test time	Fuse #	Fuse current (A)	Observation
Q04 c-e	s-c	Battery mode	10min	Breaker	--	Normal operation, no damage, no hazards.
Secondary winding of CT1	s-c	240V	10min	Breaker	14.1	Normal operation, no damage, no hazards.
Charger winding of Main transformer	s-c	240V	10min	Breaker	0.4	UPS transfer to fault mode, no output. No hazard.
D30	s-c	240V	1s	Breaker	0	Unit shutdown. No hazard.
D28	s-c	240V	1s	Breaker	0	Unit shutdown. No hazard.
C5	s-c	Battery mode	1s	--	--	Unit shutdown. No hazard.
Q10 d-s	s-c	240V	10min	Breaker	--	UPS transfer to fault mode, no output. No hazard.
Q21	s-c	Battery mode	1s	Breaker	--	Q15, Q19, Q7, Q2, Q11, Q12, Q8, Q16, Q4, Q20, Q32, Q17, Q13, Q6, Q18 and Q14 damaged. no output. No hazard.
Battery terminal	s-c	Battery mode	1s	--	--	Unit shutdown. No hazard.
AC output	o-l	240V	2h	Breaker	--	UPS shutdown when loaded to 113% rated load. Maximum temperature was: Main transformer primary winding = 78.9°C, Main transformer secondary winding = 78.0°C, CT1 winding = -67.7°C, ambient = 23.6°C. No hazard.
AC output	o-l	Battery mode	--	--	--	UPS shutdown when loaded to 125% rated load. Maximum temperature was: Main transformer primary winding = 80.2°C, Main transformer secondary winding = 85.6°C, CT1 winding = -49.0°C, ambient = 24.0°C. No hazard.
AC output	s-c	240V	1s	Breaker	--	UPS transfer to fault mode, cann’t recoveable, no hazards.
AC output	s-c	Battery mode	1s	--	--	UPS transfer to fault mode, recoveable, no hazards.
Openings	Blocked	240V	2h	Breaker	14.1	Normal operation, no damage, no hazards. Maximum temperature was: Main transformer primary winding = 84.7°C, Main transformer secondary winding = 83.9°C, CT1 winding = -68.2°C, ambient = 23.6°C. No hazard.

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Clause	Requirement + Test	Result - Remark	Verdict

Openings	Blocked	Battery mode	--	--	--	UPS discharge till stutdown. No hazards. Maximum temperature was: Main transformer primary winding = 82.4°C, Main transformer secondary winding = 85.3°C, CT1 winding = -48.6°C, ambient = 23.8°C. No hazard.
Fan	Locked	240V	1s	Breaker	14.2	Normal operation, no damage, no hazards. Maximum temperature was: Main transformer primary winding = 100.7°C, Main transformer secondary winding = 98.5°C, CT1 winding = -69.5°C, ambient = 24.2°C. No hazard.
Fan	Locked	Battery mode	--	--	--	UPS discharge till stutdown. No hazards. Maximum temperature was: Main transformer primary winding = 107.8°C, Main transformer secondary winding = 112.3°C, CT1 winding = -52.3°C, ambient = 23.6°C. No hazard.
Supplementary information: s-c=short circuit, o-c=open circuit, o-l=overload Ater all fault condition test, the samples passed the dielectric voltage test.						

C.2	TABLE: transformers						P
Loc.	Tested insulation	Working voltage peak / V (2.10.2)	Working voltage rms / V (2.10.2)	Required electric strength (5.2)	Required clearance / mm (2.10.3)	Required creepage distance / mm (2.10.4)	Required distance thr. insul. (2.10.5)
Main transfomer	Reinforced	<420	<250	3000Vac	4.0	5.0	*
Main transfomer	Basic	<420	<250	1500Vac	2.0	2.5	*
CT1	Reinforced	<420	<250	3000Vac	4.0	5.0	*
Loc.	Tested insulation			Test voltage/ V	Measured clearance / mm	Measured creepage dist./ mm	Measured distance thr. insul. / mm; number of layers
Main transfomer	Reinforced: Primary - Secondary			3000Vac	>5.0	>5.0	2 layers
Main transfomer	Basic: Primary / core-Secondary			1500Vac	>2.5	>2.5	2 layers
CT1	Reinforced: Primary - Secondary			3000Vac	>5.0	>5.0	>0.4

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Clause	Requirement + Test	Result - Remark	Verdict

CT1	Reinforced: Primary - core	3000Vac	>5.0	>5.0	>0.4
supplementary information:					
* 2 layers or 3 layers or Annex U					

Pictures

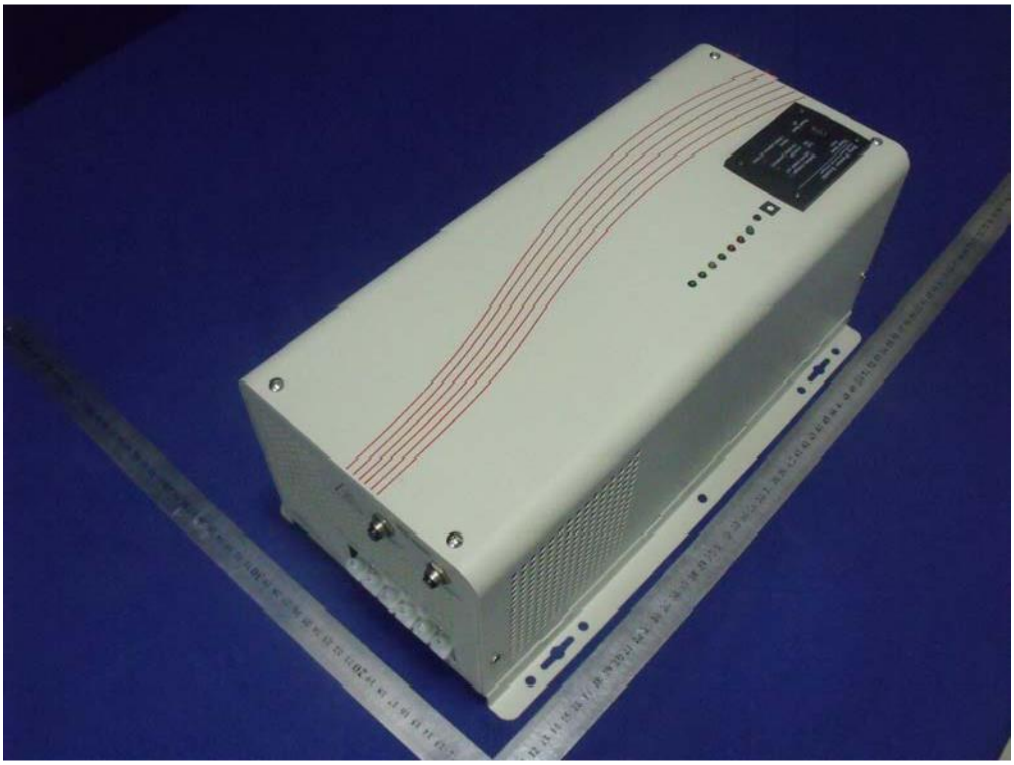

Fig. 1 Overview for model APC3012E (1)

Fig. 2 Overview for model APC3012E (2)

Pictures

Fig. 3 Inside view for model APC3012E

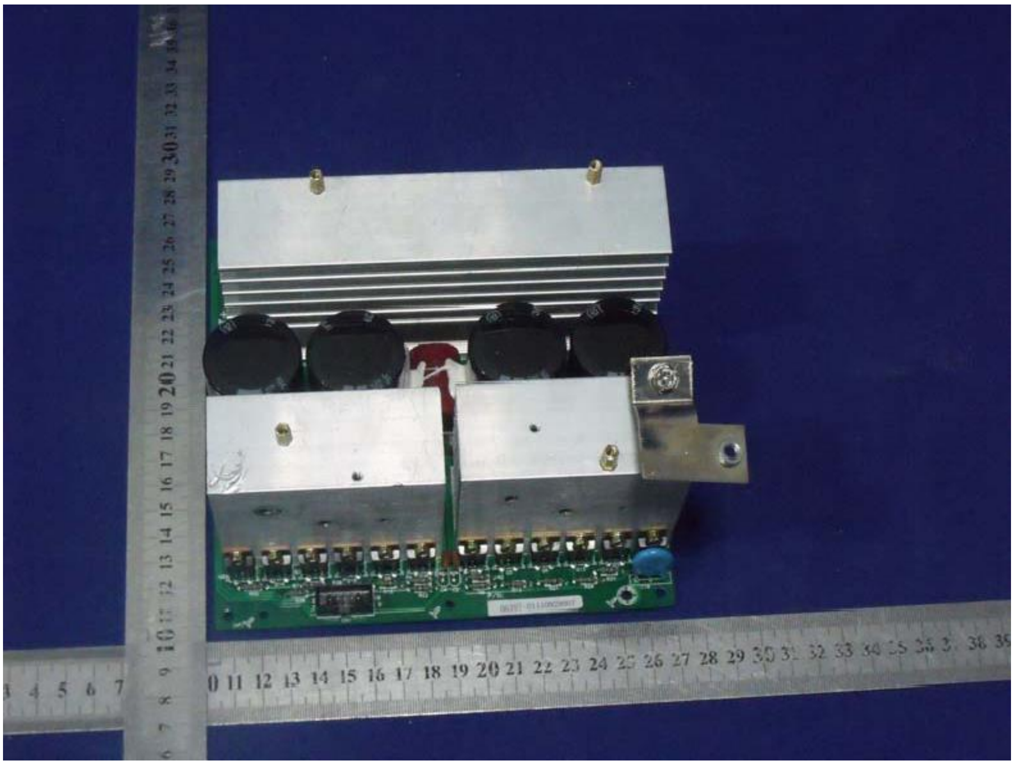

Fig. 4 PCB for model APC3012E, components side view

Pictures

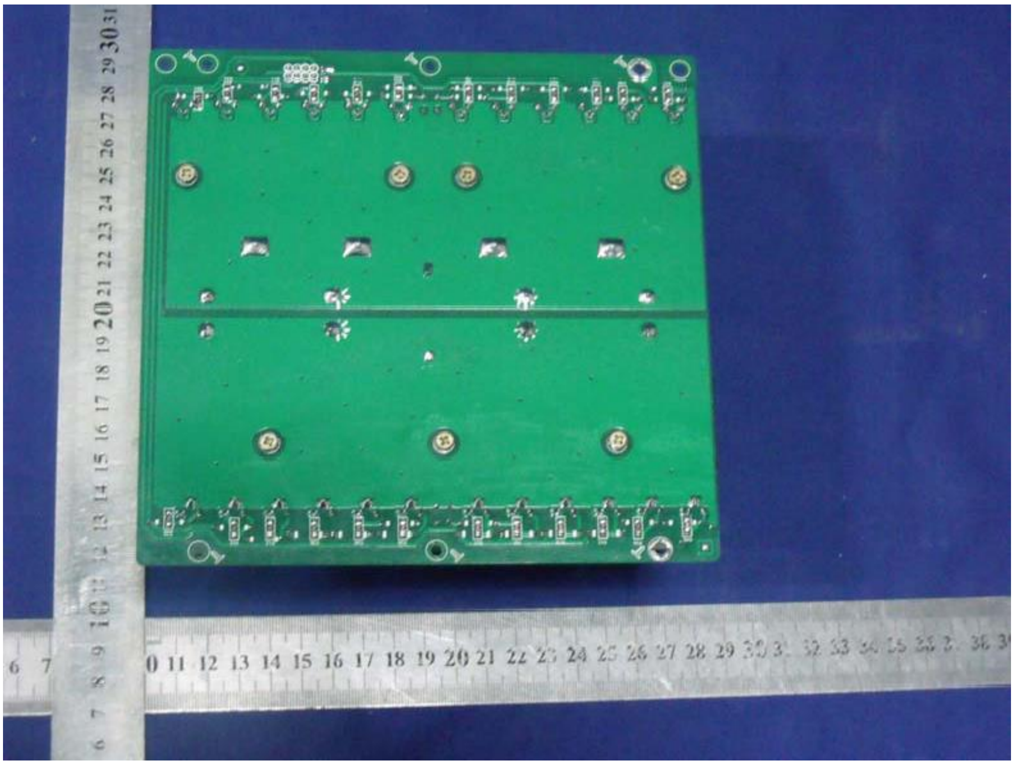

Fig. 5 PCB for model APC3012E, traces side view

APPLICATION FOR LOW VOLTAGE DIRECTIVE

On Behalf of

Tortech Pty Ltd

Inverter

Model(s): APC1024E, APC1524E, APC2024E, APC3024E, APC4024E, APC5024E, APC6024E

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TEST REPORT
EN 60950-1
Information technology equipment – Safety –
Part 1: General requirements

Report Reference No. ....:	ES111008006S	
Compiled by (name + signature)......:	Paladin Hu	Paladin Hu ....
Approved by (name + signature) .....:	William Guo	...William Guo ....
Date of issue ....:	October 28, 2011	
Total number of pages ....:	58 pages	
Testing Laboratory		
Name ....:	SHENZHEN EMTEK CO., LTD.	
Address ....:	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China	
Testing location / address ....:	Same as above	
Applicant's name ....:	Tortech Pty Ltd	
Test specification:		
Standard...:	EN 60950-1:2006+A11:2009	
Test procedure ....:	Compliance with EN 60950-1:2006+A11:2009	
Non-standard test method…………..:	N/A	
Test item description........................:	Inverter	
Model/Type reference ....:	APC1024E, APC1524E, APC2024E, APC3024E, APC4024E, APC5024E, APC6024E	

SHENZHEN EMTEK CO., LTD. TESTING

Ratings .... :	For model APC1024E: INPUT: 220-240VAC, 50/60Hz, 10A MAX, 1Ø OUTPUT: 220-240VAC, 50/60Hz, 1000W, 1Ø BATTERY: 24VDC For model APC2024E: INPUT: 220-240VAC, 50/60Hz, 20A MAX, 1Ø OUTPUT: 220-240VAC, 50/60Hz, 2000W, 1Ø BATTERY: 24VDC For model APC3024E: INPUT: 220-240VAC, 50/60Hz, 30A MAX, 1Ø OUTPUT: 220-240VAC, 50/60Hz, 3000W, 1Ø BATTERY: 24VDC For model APC4024E: INPUT: 220-240VAC, 50/60Hz, 30A MAX, 1Ø OUTPUT: 220-240VAC, 50/60Hz, 4000W, 1Ø BATTERY: 24VDC For model APC5024E: INPUT: 220-240VAC, 50/60Hz, 40A MAX, 1Ø OUTPUT: 220-240VAC, 50/60Hz, 5000W, 1Ø BATTERY: 24VDC For model APC6024E: INPUT: 220-240VAC, 50/60Hz, 40A MAX, 1Ø OUTPUT: 220-240VAC, 50/60Hz, 6000W, 1Ø BATTERY: 24VDC

Copy of marking plate:

1. Rating label for model APC1024E:

Inverter
Model APC1024E
Input: 220-240V~, 50/60Hz, 10A MAX, 1Ø
Output: 220-240V~, 50/60Hz, 1000W, 1Ø
BATTERY: 24V⎓

Made In China

2. Rating label for model APC2024E:

Inverter
Model APC2024E
Input: 220-240V~, 50/60Hz, 10A MAX, 1Ø
Output: 220-240V~, 50/60Hz, 2000W, 1Ø
BATTERY: 24V⎓

Made In China

3. Rating label for model APC3024E:

Inverter
Model APC3024E
Input: 220-240V~, 50/60Hz, 30A MAX, 1Ø
Output: 220-240V~, 50/60Hz, 3000W, 1Ø
BATTERY: 24V⎓

Made In China

4. Rating label for model APC4024E:

Inverter
Model APC4024E
Input: 220-240V~, 50/60Hz, 30A MAX, 1Ø
Output: 220-240V~, 50/60Hz, 4000W, 1Ø
BATTERY: 24V⎓

Made In China

5. Rating label for model APC5024E:

Inverter
Model APC5024E
Input: 220-240V~, 50/60Hz, 40A MAX, 1Ø
Output: 220-240V~, 50/60Hz, 5000W, 1Ø
BATTERY: 24V⎓

Made In China

6. Rating label for model APC6024E:

Inverter
Model APC6024E
Input: 220-240V~, 50/60Hz, 40A MAX, 1Ø
Output: 220-240V~, 50/60Hz, 6000W, 1Ø
BATTERY: 24V⎓

Made In China

Test item particulars

Equipment mobility...:	☐ movable ☐ hand-held ☐ transportable ☒ stationary ☐ fixed ☐ direct plug-in ☐ for building-in
Connection to the mains ....:	☐ pluggable equipment ☐type A ☐type B ☒ permanent connection
Operating condition..:	☒ continuous ☐ short-time ☐ intermittent
Over voltage category ....:	☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV
Mains supply tolerance (%)................................:	220Vac(-10%), 240Vac(+10%)
Tested for IT power systems ....:	☐ Yes ☒ No
IT testing, phase-phase voltage (V) ....:	N/A
Class of equipment ....:	☒ Class I ☐ Class II ☐ Class III ☐ Not classified
Mass of equipment (kg) ....:	>18kg
Pollution degree ....:	☒ PD 2 ☐ PD 3
IP protection class ....:	IP20

Possible test case verdicts:

- test case does not apply to the test object ....:	N (N/A)
- test object does meet the requirement.......................:	P (Pass)
- test object does not meet the requirement.................:	F (Fail)

Testing

Date of receipt of test item ....:	October 11, 2011
Date(s) of performance of tests ....:	October 12, 2011 to October 28, 2011

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

General product information:

The equipment is a inverter for general use with information technology equipment.

Double/reinforced insulation provided between primary circuits and SELV circuits by safety isolation transformer (main transformer, current transformer CT1), Relay (RY01) and sufficient clearances and creepage distances within the unit.

Model difference description:

1. Models APC1024E and APC2024E are similar to model APC3024E except for main transformer, some components etc.

2. Models APC4024Eand APC5024E are similar to model APC6024E except for main transformer, some components etc.

Summary of testing:

The product has been tested according to standard EN 60950-1:2006+A11:2009

- Tests performed on the bench
- Maximum ambient temperature: +40°C
- Tested for tropical conditions
- EUT is designed for altitudes not exceeding 2000 m.

This series of Inverter generally uses the same circuit diagrams. Unless otherwise specified, the tests are conducted on model APC3024E and APC6024E considered the worst condition.

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
1	GENERAL		P
1.5	Components		P
1.5.1	General		P
	Comply with IEC 60950 or relevant component standard	Components, which were found to affect safety aspects comply with the requirements of this aspects of the relevant IEC component standards. (see appended table 1.5.1)	P
1.5.2	Evaluation and testing of components	Components, which are certified to IEC or national standards, are applied correctly within their ratings. Components not covered by IEC standards are tested under the conditions present in the equipment.	P
1.5.3	Thermal controls	No thermal controls provided.	N
1.5.4	Transformers	Transformers used are suitable for their intended application and comply with the relevant requirements of the standard.	P
1.5.5	Interconnecting cables	Interconnecting cables are suitable for their intended application and comply with the relevant requirements of the standard.	P
1.5.6	Capacitors bridging insulation	X1 or X2 capacitors according to IEC 60384- 14:1993. (see appended table 1.5.1)	P
1.5.7	Resistors bridging insulation		P
1.5.7.1	Resistors bridging functional, basic or supplementary insulation	No such parts.	N

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.5.7.2	Resistors bridging double or reinforced insulation between a.c. mains and other circuits	Double/ reinforced insulation bridged by following resistors: 1. R177, R199, R219, R218, R196, R197, R209, R208, R188, R184, R185, R186, R206, R207, R189, R205 (I/P “N”) (499kΩ) 2. R180, R191, R214, R213, R201, R202, R212, R215, R190, R181, R187, R200, R217, R216, R192, R198 (I/P “L”) (499kΩ) 3. R265, R249, R255, R244, R266, R270, R256, R271, R237, R269, R234, R236, R267, R254, R235, R204 (O/P “N”) (499kΩ) 4. R231, R240, R261, R260, R247, R248, R259, R262, R241, R232, R233, R248, R264, R263, RR239, R203 (O/P “L”) (499KΩ)	P
1.5.7.3	Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable		N
1.5.7.4	Accessible parts	See 2.4	P
1.5.8	Components in equipment for IT power systems	TN power system.	P
1.5.9	Surge suppressors	No such parts.	N
1.5.9.1	General		N
1.5.9.2	Protection of VDRs		N
1.5.9.3	Bridging of functional insulation by a VDR	No such parts.	N
1.5.9.4	Bridging of basic insulation by a VDR	No such parts.	N
1.5.9.5	Bridging of supplementary, double or reinforced insulation by a VDR	No such parts.	N

1.6	Power interface		P
1.6.1	AC power distribution systems	For connection to TN power system.	P
1.6.2	Input current	(see appended table 1.6.2)	P
1.6.3	Voltage limit of hand-held equipment	This appliance is not a hand-held equipment.	N
1.6.4	Neutral conductor	Basic insulation of rated voltage between primary phase and neutral.	P

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.7	Marking and instructions		P
1.7.1	Power rating	See below.	P
	Rated voltage(s) or voltage range(s) (V) .... :	220-240Vac	P
	Symbol for nature of supply, for d.c. only.............. :	AC source	P
	Rated frequency or rated frequency range (Hz) ... :	50/60Hz	P
	Rated current (mA or A) .... :	See rating label	P
	Manufacturer's name or trade-mark or identification mark .... :	EYEN	P
	Model identification or type reference .... :	APC1024E, APC1524E, APC2024E, APC3024E, APC4024E, APC5024E, APC6024E	P
	Symbol for Class II equipment only .... :	Class I equipment.	N
	Other markings and symbols .... :	There is no additional marking.	N
1.7.2	Safety instructions and marking	The user manual contains information for operation, installation, servicing transport, storage and technical data.	P
1.7.2.1	General		P
1.7.2.2	Disconnect devices	The installation instructions are state that: "For PERMANENTLY CONNECTED EQUIPMENT, a readily accessible disconnect device shall be incorporated external to the equipment."	P
1.7.2.3	Overcurrent protective device		P
1.7.2.4	IT power distribution systems	TN power distribution systems	N
1.7.2.5	Operator access with a tool	All areas containing hazard(s) are inaccessible to the operator.	P
1.2.7.6	Ozone	The equipment does not produce Ozone.	N
1.7.3	Short duty cycles	Equipment is designed for continuous operation.	N
1.7.4	Supply voltage adjustment .... :	No voltage selector.	N
	Methods and means of adjustment; reference to installation instructions .... :		N
1.7.5	Power outlets on the equipment .... :	No outlet provided	N
1.7.6	Fuse identification (marking, special fusing characteristics, cross-reference) .... :	Circuit breaker provided	N

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.7	Wiring terminals	See below	P
1.7.7.1	Protective earthing and bonding terminals .... :		P
1.7.7.2	Terminals for a.c. mains supply conductors	Unit employs a terminal.	P
1.7.7.3	Terminals for d.c. mains supply conductors	The equipment is not supplied from d.c mains.	N
1.7.8	Controls and indicators		P
1.7.8.1	Identification, location and marking .... :		P
1.7.8.2	Colours .... :	Colors are acceptable due to only used for information (no safety involved even if disregarded).	P
1.7.8.3	Symbols according to IEC 60417 ....:	No standby power switch.	N
1.7.8.4	Markings using figures ....:	Not used.	N
1.7.9	Isolation of multiple power sources ....:	Only connected to AC mains	N
1.7.10	Thermostats and other regulating devices ....:	No thermostats or other regulating devices.	N
1.7.11	Durability	The marking withstands required tests. (see appended table 1.7.11)	P
1.7.12	Removable parts	No removable parts.	N
1.7.13	Replaceable batteries ....:	Additional warning statement of explosion if replaced with different batteries during servicing is marked on the rear panel.	P
	Language(s) ....:	English	--
1.7.14	Equipment for restricted access locations............:	Operator is not instructed to use a tool in order to gain access to operator access area.	N

2	PROTECTION FROM HAZARDS		P
2.1	Protection from electric shock and energy hazards		P
2.1.1	Protection in operator access areas	Operator only has access to SELV circuits and enclosure outer surface.	P
2.1.1.1	Access to energized parts	No hazardous live part is accessible.	P
	Test by inspection .... :	Operator can not contact with any parts with hazardous voltage.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test with test finger (Figure 2A) .... :	Test finger applied to openings of ventilation side. No hazardous voltage parts accessible	P
	Test with test pin (Figure 2B) .... :	The test pin can not touch hazardous voltage.	P
	Test with test probe (Figure 2C) .... :		N
2.1.1.2	Battery compartments	No battery compartment.	N
2.1.1.3	Access to ELV wiring	No ELV wiring in operator accessible area.	N
	Working voltage (Vpeak or Vrms); minimum distance through insulation (mm)		--
2.1.1.4	Access to hazardous voltage circuit wiring	No hazardous voltage wiring in operator accessible area.	N
2.1.1.5	Energy hazards .... :	Test finger applied to DC terminal. No bridge parts accessible.	P
2.1.1.6	Manual controls	Standby push button is of insulating material.	P
2.1.1.7	Discharge of capacitors in equipment	No risk of electric shock.	P
	Measured voltage (V); time-constant (s) .... :	(see appended table 2.1.1.7)	--
2.1.1.8	Energy hazards – d.c. mains supply	Not connected to DC mains supply.	N
	a) Capacitor connected to the d.c. mains supply . :		N
	b) Internal battery connected to the d.c. mains supply .... :		N
2.1.1.9	Audio amplifiers .... :	No audio amplifier.	N
2.1.2	Protection in service access areas	No service access area.	N
2.1.3	Protection in restricted access locations	The unit is not limited to be used in restricted access locations	N

2.2	SELV circuits		P
2.2.1	General requirements	The secondary circuits were tested as SELV.	P
2.2.2	Voltages under normal conditions (V) .... :	Not exceed 42.4V peak or 60V dc in SELV circuit under normal operation.	P
2.2.3	Voltages under fault conditions (V) .... :	Single fault cause did not excessive voltage in accessible SELV circuits. (see appended table 2.2.2 and 5.3)	P

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Clause	Requirement + Test	Result - Remark	Verdict
2.2.4	Connection of SELV circuits to other circuits ......:	SELV circuits are only connected to other SELV circuits.	P
2.3	TNV circuits		N
2.3.1	Limits		N
	Type of TNV circuits .... :		--
2.3.2	Separation from other circuits and from accessible parts		N
2.3.2.1	General requirements		N
2.3.2.2	Protection by basic insulation		N
2.3.2.3	Protection by earthing		N
2.3.2.4	Protection by other constructions .... :		N
2.3.3	Separation from hazardous voltages		N
	Insulation employed... :		--
2.3.4	Connection of TNV circuits to other circuits		N
	Insulation employed... :		--
2.3.5	Test for operating voltages generated externally		N
2.4	Limited current circuits		P
2.4.1	General requirements	Backfeed protection provided by safety relay which is mounted on the main PCB. The backfeed protection circuit works reliably in normal and single-fault condition.	P
2.4.2	Limit values		P
	Frequency (Hz)... :	(see appended table 2.4.2)	P
	Measured current (mA).. :	(see appended table 2.4.2)	P
	Measured voltage (V) .... :	(see appended table 2.4.2)	P
	Measured circuit capacitance (nF or µF)............... :		--
2.4.3	Connection of limited current circuits to other circuits	Only intended to be connected with SELV circuits	N
2.5	Limited power sources	(Not applied for)	N
	a) Inherently limited output		N
	b) Impedance limited output		N

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Clause	Requirement + Test	Result - Remark	Verdict
	c) Regulating network limited output under normal operating and single fault condition		N
	d) Overcurrent protective device limited output		N
	Max. output voltage (V), max. output current (A), max. apparent power (VA).................................... :		N
	Current rating of overcurrent protective device (A)		N
2.6	Provisions for earthing and bonding		P
2.6.1	Protective earthing	Reliable connection of relevant conductive parts to the PE terminal by appliance inlet.	P
2.6.2	Functional earthing	Compliance checked.	P
2.6.3	Protective earthing and protective bonding conductors	Protective earthing and protective bonding conductors have sufficient current-carrying capacity.	P
2.6.3.1	General		P
2.6.3.2	Size of protective earthing conductors		P
	Rated current (A), cross-sectional area (mm^2), AWG .... :		--
2.6.3.3	Size of protective bonding conductors		P
	Rated current (A), cross-sectional area (mm^2), AWG .... :	According to table 3B. 10AWG minimum.	P
2.6.3.4	Resistance of earthing conductors and their terminations; resistance (Ω), voltage drop (V), test current (A), duration (min) .... :	≤0.1Ω, see appended table 2.6.3.3	P
2.6.3.5	Colour of insulation... :	Green-yellow.	P
2.6.4	Terminals		N
2.6.4.1	General		N
2.6.4.2	Protective earthing and bonding terminals		N
	Rated current (A), type, nominal thread diameter (mm).. :		--
2.6.4.3	Separation of the protective earthing conductor from protective bonding conductors		N
2.6.5	Integrity of protective earthing		N
2.6.5.1	Interconnection of equipment	No interconnection of equipment.	N

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Clause	Requirement + Test	Result - Remark	Verdict
2.6.5.2	Components in protective earthing conductors and protective bonding conductors	There are no switches or overcurrent protective devices in the protective earthing / bonding conductors.	P
2.6.5.3	Disconnection of protective earth	It is not possible to disconnect protective earth without disconnecting mains; an appliance coupler is used as disconnect device.	P
2.6.5.4	Parts that can be removed by an operator	No operator removable parts with protective earth connection except supply cord.	P
2.6.5.5	Parts removed during servicing	Protective earthed parts cannot be removed in a way which impairs safety.	P
2.6.5.6	Corrosion resistance	No risk of corrosion.	P
2.6.5.7	Screws for protective bonding		P
2.6.5.8	Reliance on telecommunication network or cable distribution system	Protective earthing does not rely on a telecommunication network.	N
2.7	Overcurrent and earth fault protection in primary circuits		P
2.7.1	Basic requirements	Protective device is integrated in the equipment, see also Sub-clause 5.3.	P
	Instructions when protection relies on building installation	Protective device is integrated in the equipment, see also Sub-clause 5.3.	P
2.7.2	Faults not simulated in 5.3.7		N
2.7.3	Short-circuit backup protection	Adequate protective device.	P
2.7.4	Number and location of protective devices .... :	In Norway, IT power distribution system is used. Equipment with a single protective device is accepted in Norway. Other countries (e.g. Germany and Belgium) may have additional requirements.	P
2.7.5	Protection by several devices	Only one protective device. See Sub-clause 2.7.4.	P

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Clause	Requirement + Test	Result - Remark	Verdict
2.7.6	Warning to service personnel ....:	After operation of the protective device, the equipment is still under voltage if it is connected to an IT-power distribution system. A warning is required for service persons. Norway does not require this warning. See also Sub-clause 2.7.4.	N
2.8	Safety interlocks		N
2.8.1	General principles	No safety interlocks.	N
2.8.2	Protection requirements		N
2.8.3	Inadvertent reactivation		N
2.8.4	Fail-safe operation		N
2.8.5	Moving parts		N
2.8.6	Overriding		N
2.8.7	Switches and relays		N
2.8.7.1	Contact gaps (mm) ....:		N
2.8.7.2	Overload test		N
2.8.7.3	Endurance test		N
2.8.7.4	Electric strength test		N
2.8.8	Mechanical actuators		N
2.9	Electrical insulation		P
2.9.1	Properties of insulating materials	Suitable material according to their thermal electrical and mechanical properties.	P
2.9.2	Humidity conditioning	Humidity treatment performed for 48 hrs.	P
	Relative humidity (%), temperature (°C) ....:	90-95%, 30°C.	P
2.9.3	Grade of insulation	The adequate levels of safety insulation is provided and maintained to comply with the requirements of this standard	P
2.9.4	Separation from hazardous voltages	See below.	P
	Method(s) used ....:	Method 1 and 2	--
2.10	Clearances, creepage distances and distances through insulation		P
2.10.1	General		P
2.10.1.1	Frequency ....:	Considered.	P

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.1.2	Pollution degrees .... :	Pollution Degree 2.	P
2.10.1.3	Reduced values for functional insualtion	The functional insulation complied with clause 5.3.4.	P
2.10.1.4	Intervening unconnected conductive parts	Considered.	P
2.10.1.5	Insulation with varying dimensions	No such transformer used.	N
2.10.1.6	Special separation requirements	Special separation is not used.	N
2.10.1.7	Insulation in circuits generating starting pulses	No insulation in circuit generating starting pulses.	N
2.10.2	Determination of working voltage	(See appended table 2.10.2)	P
2.10.2.1	General		P
2.10.2.2	RMS working voltage	(See appended table 2.10.2)	P
2.10.2.3	Peak working voltage	(See appended table 2.10.2)	P
2.10.3	Clearances	(see appended table 2.10.3 and 2.10.4)	P
2.10.3.1	General		P
2.10.3.2	Mains transient voltages	Normal transient voltage considered	N
	a) AC mains supply .... :		N
	b) Earthed d.c. mains supplies .... :		N
	c) Unearthed d.c. mains supplies .... :		N
	d) Battery operation .... :		N
2.10.3.3	Clearances in primary circuits	(see appended table 2.10.3 and 2.10.4)	P
2.10.3.4	Clearances in secondary circuits	Only the functional insulation in secondary circuits complied with clause 5.3.4.	N
2.10.3.5	Clearances in circuits having starting pulses	The circuit will not generating starting pulse.	N
2.10.3.6	Transients from a.c. mains supply .... :	Considered.	P
2.10.3.7	Transients from d.c. mains supply .... :	Not connected to d.c mains supply.	N
2.10.3.8	Transients from telecommunication networks and cable distribution systems .... :	Not connected to telecommunication networks and cable distribution systems.	N
2.10.3.9	Measurement of transient voltage levels	Normal transient voltage considered	N
	a) Transients from a mains suplply		N
	For an a.c. mains supply .... :		N
	For a d.c. mains supply .... :		N

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Transients from a telecommunication network :		N
2.10.4	Creepage distances		P
2.10.4.1	General	Considered	P
2.10.4.2	Material group and caomparative tracking index		P
	CTI tests .... :	Material group IIIb is assumed to be used	P
2.10.4.3	Minimum creepage distances	(see appended table 2.10.3 and 2.10.4)	P
2.10.5	Solid insulation	Solid or laminated insulating materials having adequate thickness are provided.	P
2.10.5.1	General	Considered.	P
2.10.5.2	Distances through insulation	(see appended table 2.10.5)	P
2.10.5.3	Insulating compound as solid insulation	No such construction used.	N
2.10.5.4	Semiconductor devices	No such component used.	N
2.10.5.5.	Cemented joints	Not used.	N
2.10.5.6	Thin sheet material – General	Thin sheet material in form of polyester tape used in transformer	P
2.10.5.7	Separable thin sheet material		P
	Number of layers (pcs) .... :	3 layers	P
2.10.5.8	Non-separable thin sheet material	Not used.	N
2.10.5.9	Thin sheet material – standard test procedure	Not used.	N
	Electric strength test		--
2.10.5.10	Thin sheet material – alternative test procedure	(see appended table 2.10.5)	P
	Electric strength test	(see appended table 2.10.5)	P
2.10.5.11	Insulation in wound components	Not used.	N
2.10.5.12	Wire in wound components		N
	Working voltage .... :		N
	a) Basic insulation not under stress .... :		N
	b) Basic, supplemetary, reinforced insulation .... :		N
	c) Compliance with Annex U .... :		N
	Two wires in contact inside wound component; angle between 45° and 90° .... :		N
2.10.5.13	Wire with solvent-based enamel in wound components	No wire with solvent-based enamel in wound components.	N
	Electric strength test		N
	Routine test		N

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.5.14	Additional insulation in wound components	No additional insulation used.	N
	Working voltage .... :		N
	- Basic insulation not under stress .... :		N
	- Supplemetary, reinforced insulation .... :		N
2.10.6	Construction of printed boards	See below.	P
2.10.6.1	Uncoated printed boards	(see appended table 2.10.3 and 2.10.4)	P
2.10.6.2	Coated printed boards		N
2.10.6.3	Insulation between conductors on the same inner surface of a printed board		N
2.10.6.4	Insulation between conductors on different layers of a printed board		N
	Distance through insulation		N
	Number of insulation layers (pcs).......................... :		N
2.10.7	Component external terminations	Coatings not used over terminations to increase effective creepage and clearance distances.	N
2.10.8	Tests on coated printed boards and coated components	No special coating in order to reduce distance.	N
2.10.8.1	Sample preparation and preliminary inspection		N
2.10.8.2	Thermal conditioning		N
2.10.8.3	Electric strength test		N
2.10.8.4	Abrasion resistance test		N
2.10.9	Thermal cycling	No special insulation in order to reduce distance.	N
2.10.10	Test for Pollution Degree 1 environment and insulating compound	For relay, see appended table 1.5.1.	P
2.10.11	Tests for semiconductor devices and cemented joints	No such device used.	N
2.10.12	Enclosed and sealed parts	For relay, see appended table 1.5.1.	P

3	WIRING, CONNECTIONS AND SUPPLY		P
3.1	General		P
3.1.1	Current rating and overcurrent protection	Adequate cross sectional areas on internal wiring.	P

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Clause	Requirement + Test	Result - Remark	Verdict
3.1.2	Protection against mechanical damage	Wireways are smooth and free from edges. Wires are adequately fixed to prevent excessive strain on wire and terminals and avoiding damage to the insulation of the conductors.	P
3.1.3	Securing of internal wiring	Internal wiring is secured against excessive strain, loosening of terminals and damage to the conductor insulation.	P
3.1.4	Insulation of conductors	Insulation on internal conductors is considered to be of adequate quality and suitable for the application and the working voltage involved.	P
3.1.5	Beads and ceramic insulators	No beads or similar ceramic insulators on conductors.	N
3.1.6	Screws for electrical contact pressure	No screw for electrical contact.	N
3.1.7	Insulating materials in electrical connections	No contact pressure through insulating material.	P
3.1.8	Self-tapping and spaced thread screws	Thread-cutting or space thread screws are not used for electrical connections.	P
3.1.9	Termination of conductors	Terminations cannot become displaced so that clearances and creepage distances can be reduced.	P
	10 N pull test	Conducted.	P
3.1.10	Sleeving on wiring	Sleeves are used as supplementary insulation.	P
3.2	Connection to a mains supply		P
3.2.1	Means of connection	The unit is provided with a terminal for permanent connection to the supply.	P
3.2.1.1	Connection to an a.c. mains supply	For connection to the supply by terminal.	P
3.2.1.2	Connection to a d.c. mains supply	The equipment is not for connection to a d.c. mains supply.	N
3.2.2	Multiple supply connections	Only one supply connection.	N

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Clause	Requirement + Test	Result - Remark	Verdict
3.2.3	Permanently connected equipment	The equipment is not intended for permanent connection to the mains.	N
	Number of conductors, diameter of cable and conduits (mm) .... :		--
3.2.4	Appliance inlets	Not provided	N
3.2.5	Power supply cords		N
3.2.5.1	AC power supply cords		N
	Type .... :		N
	Rated current (A), cross-sectional area (mm^2), AWG .... :		N
3.2.5.2	DC power supply cords	Not provided.	N
3.2.6	Cord anchorages and strain relief		N
	Mass of equipment (kg), pull (N) .... :		--
	Longitudinal displacement (mm) .... :		--
3.2.7	Protection against mechanical damage	No sharp points or cutting edges on the equipment surfaces.	N
3.2.8	Cord guards	The equipment is neither hand-held nor intended to be moved during operation.	N
	Diameter or minor dimension D (mm); test mass (g) .... :		--
	Radius of curvature of cord (mm).......................... :		--
3.2.9	Supply wiring space		N

3.3	Wiring terminals for connection of external conductors		P
3.3.1	Wiring terminals		N
3.3.2	Connection of non-detachable power supply cords		N
3.3.3	Screw terminals		P
3.3.4	Conductor sizes to be connected		P
	Rated current (A), cord/cable type, cross-sectional area (mm^2).. :		--
3.3.5	Wiring terminal sizes		N
	Rated current (A), type, nominal thread diameter (mm) .... :		--
3.3.6	Wiring terminal design		N
3.3.7	Grouping of wiring terminals		N
3.3.8	Stranded wire		N

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Clause	Requirement + Test	Result - Remark	Verdict

3.4	Disconnection from the mains supply		P
3.4.1	General requirement	See Sub-clause 3.4.2.	P
3.4.2	Disconnect devices	Permanently connected equipment.	P
3.4.3	Permanently connected equipment	External disconnect devices would be supplied with the equipment.	P
3.4.4	Parts which remain energized	When supply is disconnected, there are no parts remaining with hazardous voltage or energy in the equipment.	P
3.4.5	Switches in flexible cords	No switch.	N
3.4.6	Number of poles - single-phase and d.c. equipment	The disconnect device disconnects both poles simultaneously.	P
3.4.7	Number of poles - three-phase equipment	Single phase equipment.	N
3.4.8	Switches as disconnect devices	No switches provided.	N
3.4.9	Plugs as disconnect devices	The appliance coupler is regarded as disconnect device, no warning is required.	N
3.4.10	Interconnected equipment	No interconnections using hazardous voltages.	N
3.4.11	Multiple power sources	One power source only.	N

3.5	Interconnection of equipment		P
3.5.1	General requirements	SELV voltage connections for the output. Not compatible with connection for the input.	P
3.5.2	Types of interconnection circuits ....:	See 3.5.1	P
3.5.3	ELV circuits as interconnection circuits	No ELV interconnection.	N
3.5.4	Data ports for additional equipment	No data ports.	N

4	PHYSICAL REQUIREMENTS		P
4.1	Stability		P
	Angle of 10°	The unit do not overbalance when tilted to an angle of 10 degree.	P
	Test force (N) .... :		P

4.2	Mechanical strength		P

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Clause	Requirement + Test	Result - Remark	Verdict
4.2.1	General	Tests performed and passed. Results see below. After the tests, unit complied with the requirements of sub-clauses 2.1.1, 2.6.1, 2.10 and 4.4.1.	P
4.2.2	Steady force test, 10 N	10 N applied to components.	P
4.2.3	Steady force test, 30 N	30 N applied to parts inside the UPS.	P
4.2.4	Steady force test, 250 N	250 N applied to outer enclosure. No energy or other hazards.	P
4.2.5	Impact test	No hazard as a result from steel ball impact test.	P
	Fall test	No hazard as a result from steel ball impact test.	P
	Swing test	No hazard as result from steel sphere ball swung test.	P
4.2.6	Drop test; height (mm) .... :	Not required for this equipment.	N
4.2.7	Stress relief test	Not required for this equipment.	N
4.2.8	Cathode ray tubes	No cathode ray tube.	N
	Picture tube separately certified .... :		--
4.2.9	High pressure lamps	No high pressure lamp provided.	N
4.2.10	Wall or ceiling mounted equipment; force (N) ...... :	Not for wall or ceiling mounting.	N
4.3	Design and construction		
4.3.1	Edges and corners	Edges and corners of the enclosure are rounded.	P
4.3.2	Handles and manual controls; force (N).............:	No axial pull applied to pushbutton of stand-by switch because it is unlikely to be pulled.	N
4.3.3	Adjustable controls	No adjustable controls.	N
4.3.4	Securing of parts	Mechanical fixings in such a way designed that they will withstand mechanical stress occurring in normal use.	P
4.3.5	Connection by plugs and sockets	No mismatch of connectors.	P
4.3.6	Direct plug-in equipment	Not direct plug-in type.	N

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Clause	Requirement + Test	Result - Remark	Verdict
	Torque ....:		--
	Compliance with the relevant mains plug standard ....:		--
4.3.7	Heating elements in earthed equipment	No heating elements provided.	N
4.3.8	Batteries	No batteries	N
	- Overcharging of a rechargeable battery		N
	- Unintentional charging of a non-rechargeable battery		N
	- Reverse charging of a rechargeable battery		N
	- Excessive discharging rate for any battery		N
4.3.9	Oil and grease	Insulation is not exposed to oil, grease etc.	N
4.3.10	Dust, powders, liquids and gases	The equipment does not generate ionizing radiation or use a laser, and does not contain flammable liquids or gases.	N
4.3.11	Containers for liquids or gases	No containers for liquids or gases in the equipment.	N
4.3.12	Flammable liquids ....:	The equipment does not contain flammable liquid.	N
	Quantity of liquid (l) ....:		--
	Flash point (°C) ....:		--
4.3.13	Radiation		P
4.3.13.1	General		P
4.3.13.2	Ionizing radiation	No ionising radiation.	N
	Measured radiation (pA/kg) ....:		N
	Measured high-voltage (kV) ....:		N
	Measured focus voltage (kV) ....:		N
	CRT markings ....:		N
4.3.13.3	Effect of ultraviolet (UV) radiation on materials	No ultraviolet radiation.	N
	Part, property, retention after test, flammability classification ....:		N
4.3.13.4	Human exposure to ultraviolet (UV) radiation .....:		N
4.3.13.5	Laser (including LEDs)	Non-lasing LEDs provided for indicating only.	P
	Laser class ....:	Class 1	--

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Clause	Requirement + Test	Result - Remark	Verdict
4.3.13.6	Other types .... :	The equipment does not generate other types of radiation.	N
4.4	Protection against hazardous moving parts		P
4.4.1	General	DC fan located at secondary circuit. The enclosure of the unit provide as fan guard. Test finger applied to openings. No fan blade accessible.	P
4.4.2	Protection in operator access areas .... :	See above.	P
4.4.3	Protection in restricted access locations .... :	Not for restricted access locations.	N
4.4.4	Protection in service access areas	See 4.4.1	P
4.5	Thermal requirements		P
4.5.1	General		P
4.5.2	Temperature tests	(see appended table 4.5)	P
	Normal load condition per Annex L .... :		P
4.5.3	Temperature limits for materials	(see appended table 4.5)	P
4.5.4	Touch temperature limits	(see appended table 4.5)	P
4.5.5	Resistance to abnormal heat .... :	(see appended table 4.5.5)	P
4.6	Openings in enclosures		P
4.6.1	Top and side openings	See appended table 4.6.1 and 4.6.2	P
	Dimensions (mm) .... :		P
4.6.2	Bottoms of fire enclosures	See appended table 4.6.1 and 4.6.2	P
	Construction of the bottomm, dimensions (mm) .. :		--
4.6.3	Doors or covers in fire enclosures	No doors or covers in fire enclosure.	N
4.6.4	Openings in transportable equipment	Not transportable equipment.	N
4.6.4.1	Constructional design measures		N
	Dimensions (mm) .... :		--
4.6.4.2	Evaluation measures for larger openings		N
4.6.4.3	Use of metallized parts		N
4.6.5	Adhesives for constructional purposes	No adhesives used for constructional purposes.	N

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Clause	Requirement + Test	Result - Remark	Verdict
	Conditioning temperature (°C), time (weeks) .... :		--
4.7	Resistance to fire		P
4.7.1	Reducing the risk of ignition and spread of flame	Method 1 is used.	P
	Method 1, selection and application of components wiring and materials	Method 1 used. No excessive temperatures. No easily burning materials employed. Safety relevant components used within their specified temperature limits. (see appended table 4.7)	P
	Method 2, application of all of simulated fault condition tests	Not used method 2.	N
4.7.2	Conditions for a fire enclosure	For all parts inside enclosure, a fire enclosure is required.	P
4.7.2.1	Parts requiring a fire enclosure		P
4.7.2.2	Parts not requiring a fire enclosure		N
4.7.3	Materials		P
4.7.3.1	General	Components and materials have adequate flammability classification. For details see table 1.5.1	P
4.7.3.2	Materials for fire enclosures	Metal material.	P
4.7.3.3	Materials for components and other parts outside fire enclosures	No parts outside the fire enclosure.	P
4.7.3.4	Materials for components and other parts inside fire enclosures	Other materials inside fire enclosure are minimum V-2 material.	P
4.7.3.5	Materials for air filter assemblies	No air filters in the equipment.	N
4.7.3.6	Materials used in high-voltage components	No parts exceeding 4kV.	N
5	ELECTRICAL REQUIREMENTS AND SIMULATED ABNORMAL CONDITIONS		P
5.1	Touch current and protective conductor current		P
5.1.1	General	Test conducted in accordance with 5.1.2 to 5.1.7.	P
5.1.2	Configuration of equipment under test (EUT)	EUT has only one mains connection.	P
5.1.2.1	Single connection to an a.c. mains supply	No interconnection of equipment.	P
5.1.2.2	Redundant multiple connections to an a.c. mains supply	No multiple power sources.	N

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Clause	Requirement + Test	Result - Remark	Verdict
5.1.2.3	Simultaneous multiple connections to an a.c. mains supply	No multiple power sources.	N
5.1.3	Test circuit	Using figure 5A.	P
5.1.4	Application of measuring instrument	Measuring instrument D1 is used.	P
5.1.5	Test procedure	The touch current was measured from primary to enclosure and primary to output.	P
5.1.6	Test measurements		P
	Supply voltage (V) ....:	(See appended table 5.1)	--
	Measured touch current (mA) ....:	(See appended table 5.1)	--
	Max. allowed touch current (mA) ....:	(See appended table 5.1)	--
	Measured protective conductor current (mA) ....:		--
	Max. allowed protective conductor current (mA)...:		--
5.1.7	Equipment with touch current exceeding 3,5 mA	The touch current does not exceed 3.5mA.	N
5.1.7.1	General ....:		N
5.1.7.2	Simultaneous multiple connections to the supply		N
5.1.8	Touch currents to telecommunication networks and cable distribution systems and from telecommunication networks		N
5.1.8.1	Limitation of the touch current to a telecommunication network or to a cable distribution system	No test necessary.	N
	Supply voltage (V) ....:		--
	Measured touch current (mA) ....:		--
	Max. allowed touch current (mA) ....:		--
5.1.8.2	Summation of touch currents from telecommunication networks		N
	a) EUT with earthed telecommunication ports .....:		N
	b) EUT whose telecommunication ports have no reference to protective earth		N
5.2	Electric strength		P
5.2.1	General	(see appended table 5.2)	P
5.2.2	Test procedure	(see appended table 5.2)	P
5.3	Abnormal operating and fault conditions		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.3.1	Protection against overload and abnormal operation	(see appended table 5.3)	P
5.3.2	Motors	TÜV approved DC fan used in secondary circuit.	P
5.3.3	Transformers	(see appended Annex C)	P
5.3.4	Functional insulation...:	Short-circuited, results see appended table 5.3.	P
5.3.5	Electromechanical components	No electromechanical components.	N
5.3.6	Audio amplifiers in ITE ....:	No audio amplifier in equipment.	N
5.3.7	Simulation of faults	Results see appended table 5.3.	P
5.3.8	Unattended equipment	No thermostats, temperature limiters or thermal cut-outs.	P
5.3.9	Compliance criteria for abnormal operating and fault conditions	See below.	P
5.3.9.1	During the tests	No fire or molten metal occurred and no deformation of enclosure during the tests.	P
5.3.9.2	After the tests	No reduction of clearance and creepage distances. Electric strength test is made on Funcational, Basic and reinforced insulation.	P

6	CONNECTION TO TELECOMMUNICATION NETWORKS		N
6.1	Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment		N
6.1.1	Protection from hazardous voltages		N
6.1.2	Separation of the telecommunication network from earth		N
6.1.2.1	Requirements		N
	Supply voltage (V) .... :	1.	N
	Current in the test circuit (mA) .... :		--
6.1.2.2	Exclusions .... :		N

6.2	Protection of equipment users from overvoltages on telecommunication networks		N
6.2.1	Separation requirements		N
6.2.2	Electric strength test procedure		N
6.2.2.1	Impulse test		N
6.2.2.2	Steady-state test		N

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Clause	Requirement + Test	Result - Remark	Verdict
6.2.2.3	Compliance criteria		N
6.3	Protection of the telecommunication wiring system from overheating *(The circuit is not intended to supply other units via telecommunication wiring system.)*		N
	Max. output current (A) .... :		N
	Current limiting method .... :		N
7	CONNECTION TO CABLE DISTRIBUTION SYSTEMS		N
7.1	General	Not connected to Cable Distribution System.	N
7.2	Protection of cable distribution system service persons, and users of other equipment connected to the system, from hazardous voltages in the equipment		N
7.3	Protection of equipment users from overvoltages on the cable distribution system		N
7.4	Insulation between primary circuits and cable distribution systems		N
7.4.1	General		N
7.4.2	Voltage surge test		N
7.4.3	Impulse test		N
A	ANNEX A, TESTS FOR RESISTANCE TO HEAT AND FIRE		N
A.1	Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment (see 4.7.3.2)		N
A.1.1	Samples.. :		N
	Wall thickness (mm) .... :		--
A.1.2	Conditioning of samples; temperature (°C) .... :		N
A.1.3	Mounting of samples .... :		N
A.1.4	Test flame (see IEC 60695-11-3)		N
	Flame A, B, C or D .... :		--
A.1.5	Test procedure		N
A.1.6	Compliance criteria		N
	Sample 1 burning time (s) .... :		--
	Sample 2 burning time (s) .... :		--
	Sample 3 burning time (s) .... :		--

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Clause	Requirement + Test	Result - Remark	Verdict
A.2	Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2 and 4.7.3.4)		N
A.2.1	Samples, material .... :		N
	Wall thickness (mm) .... :		--
A.2.2	Conditioning of samples; temperature (°C) .... :		N
A.2.3	Mounting of samples .... :		N
A.2.4	Test flame (see IEC 60695-11-4)		N
	Flame A, B or C .... :		--
A.2.5	Test procedure		N
A.2.6	Compliance criteria		N
	Sample 1 burning time (s) .... :		--
	Sample 2 burning time (s) .... :		--
	Sample 3 burning time (s) .... :		--
A.2.7	Alternative test acc. to IEC 60695-11-5, cl. 5 and 9		N
	Sample 1 burning time (s) .... :		--
	Sample 2 burning time (s) .... :		--
	Sample 3 burning time (s) .... :		--
A.3	Hot flaming oil test (see 4.6.2)		--
A.3.1	Mounting of samples		N
A.3.2	Test procedure		N
A.3.3	Compliance criterion		N

B	ANNEX B, MOTOR TESTS UNDER ABNORMAL CONDITIONS (see 4.7.2.2 and 5.3.2)		N
B.1	General requirements		N
	Position .... :		--
	Manufacturer .... :		--
	Type .... :		--
	Rated values .... :		--
B.2	Test conditions		N
B.3	Maximum temperatures		N
B.4	Running overload test		N
B.5	Locked-rotor overload test		N
	Test duration (days) .... :		--
	Electric strength test: test voltage (V) .... :		--

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Clause	Requirement + Test	Result - Remark	Verdict
B.6	Running overload test for d.c. motors in secondary circuits		N
B.6.1	General		N
B.6.2	Test procedure		N
B.6.3	Alternative test procedure		N
B.6.4	Electric strength test; test voltage (V) .... :		N
B.7	Locked-rotor overload test for d.c. motors in secondary circuits		N
B.7.1	General		N
B.7.2	Test procedure		N
B.7.3	Alternative test procedure		N
B.7.4	Electric strength test; test voltage (V) ....:		N
B.8	Test for motors with capacitors		N
B.9	Test for three-phase motors		N
B.10	Test for series motors		N
	Operating voltage (V) .... :		N
C	ANNEX C, TRANSFORMERS (see 1.5.4 and 5.3.3)		P
	Position .... :	Main transformer, current transformer CT1	--
	Manufacturer .... :	(see appended table 1.5.1)	--
	Type .... :	(see appended table 1.5.1)	--
	Rated values .... :	(see appended table 1.5.1)	--
	Method of protection.. :	Protection by electronic circuits and software controls.	--
C.1	Overload test	(see appended table 5.3)	P
C.2	Insulation	(see appended table 5.2)	P
	Protection from displacement of windings :		P
D	ANNEX D, MEASURING INSTRUMENTS FOR TOUCH-CURRENT TESTS (see 5.1.4)		P
D.1	Measuring instrument	As in figure D1 used.	P
D.2	Alternative measuring instrument	Not used.	N
E	ANNEX E, TEMPERATURE RISE OF A WINDING (see 1.4.13) *Thermocouple method used*		P
F	ANNEX F, MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES (see 2.10 and Annex G)		P

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Clause	Requirement + Test	Result - Remark	Verdict

G	ANNEX G, ALTERNATIVE METHOD FOR DETERMINING MINIMUM CLEARANCES		N
G.1	Clearances		N
G.1.1	General		N
G.1.2	Summary of the procedure for determining minimum clearances		N
G.2	Determination of mains transient voltage (V)		N
G.2.1	AC mains supply .... :		N
G.2.2	Earthed d.c. mains supplies .... :		N
G.2.3	Unearthed d.c. mains supplies .... :		N
G.2.4	Battery operation .... :		N
G.3	Determination of telecommunication network transient voltage (V) .... :		N
G.4	Determination of required withstand voltage (V)		N
G.4.1	Mains transients and internal repetitive peaks .... :		N
G.4.2	Transients from telecommunication networks ..... :		N
G.4.3	Combination of transients		N
G.4.4	Transients from cable distribution systems		N
G.5	Measurement of transient voltages (V)		N
	a) Transients from a mains supply		--
	For an a.c. mains supply		--
	For a d.c. mains supply		--
	b) Transients from a telecommunication network		--
G.6	Determination of minimum clearances .... :		N

H	ANNEX H, IONIZING RADIATION (see 4.3.13)		N

J	ANNEX J, TABLE OF ELECTROCHEMICAL POTENTIALS (see 2.6.5.6)		N
	Metal(s) used :		--

K	ANNEX K, THERMAL CONTROLS (see 1.5.3 and 5.3.8)		N
K.1	Making and breaking capacity		N
K.2	Thermostat reliability; operating voltage (V) .... :		N
K.3	Thermostat endurance test; operating voltage (V) .... :		N
K.4	Temperature limiter endurance; operating voltage (V) .... :		N

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Clause	Requirement + Test	Result - Remark	Verdict
K.5	Thermal cut-out reliability		N
K.6	Stability of operation		N
L	ANNEX L, NORMAL LOAD CONDITIONS FOR SOME TYPES OF ELECTRICAL BUSINESS EQUIPMENT (see 1.2.2.1 and 4.5.2)		N
L.1	Typewriters		N
L.2	Adding machines and cash registers		N
L.3	Erasers		N
L.4	Pencil sharpeners		N
L.5	Duplicators and copy machines		N
L.6	Motor-operated files		N
L.7	Other business equipment		N
M	ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1)		N
M.1	Introduction		N
M.2	Method A		N
M.3	Method B		N
M.3.1	Ringing signal		N
M.3.1.1	Frequency (Hz) .... :		N
M.3.1.2	Voltage (V) .... :		N
M.3.1.3	Cadence; time (s), voltage (V) .... :		N
M.3.1.4	Single fault current (mA) .... :		N
M.3.2	Tripping device and monitoring voltage .... :		N
M.3.2.1	Conditions for use of a tripping device or a monitoring voltage		N
M.3.2.2	Tripping device		N
M.3.2.3	Monitoring voltage (V) .... :		N
N	ANNEX N, IMPULSE TEST GENERATORS (see 1.5.7.2, 1.5.7.3, 2.10.3.9, 6.2.2.1, 7.3.2, 7.4.3 and Clause G.5)		N
N.1	ITU-T impulse test generators		N
N.2	IEC 60065 impulse test generator		N
Q	ANNEX Q, Voltage dependent resistors (VDRs) (see 1.5.9.1)		N
	a) Preferred climatic categories .... :		N
	b) Maximum continuous voltage .... :		N
	c) Pulse current .... :		N

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Clause	Requirement + Test	Result - Remark	Verdict
R	ANNEX R, EXAMPLES OF REQUIREMENTS FOR QUALITY CONTROL PROGRAMMES		N
R.1	Minimum separation distances for unpopulated coated printed boards (see 2.10.6.2)		N
R.2	Reduced clearances (see 2.10.3)		N
S	ANNEX S, PROCEDURE FOR IMPULSE TESTING (see 6.2.2.3)		N
S.1	Test equipment		N
S.2	Test procedure		N
S.3	Examples of waveforms during impulse testing		N
T	ANNEX T, GUIDANCE ON PROTECTION AGAINST INGRESS OF WATER (see 1.1.2)		N
			--
U	ANNEX U, INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION (see 2.10.5.4)		N
			--
V	ANNEX V, AC POWER DISTRIBUTION SYSTEMS (see 1.6.1)		P
V.1	Introduction		P
V.2	TN power distribution systems		P
W	ANNEX W, SUMMATION OF TOUCH CURRENTS		N
W.1	Touch current from electronic circuits		N
W.1.1	Floating circuits		N
W.1.2	Earthed circuits		N
W.2	Interconnection of several equipments		N
W.2.1	Isolation		N
W.2.2	Common return, isolated from earth		N
W.2.3	Common return, connected to protective earth		N
X	ANNEX X, MAXIMUM HEATING EFFECT IN TRANSFORMER TESTS (see clause C.1)		P
X.1	Determination of maximum input current		P
X.2	Overload test procedure		P
Y	ANNEX Y, ULTRAVIOLET LIGHT CONDITIONING TEST (see 4.3.13.3)		N
Y.1	Test apparatus .... :	No ultraviolet light.	N

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Clause	Requirement + Test	Result - Remark	Verdict

Y.2	Mounting of test samples .... :		N
Y.3	Carbon-arc light-exposure apparatus .... :		N
Y.4	Xenon-arc light exposure apparatus .... :		N

Z	ANNEX Z, OVERVOLTAGE CATEGORIES (see 2.10.3.2 and Clause G.2)	N

AA	ANNEX AA, MANDREL TEST (see 2.10.5.8)	N

BB	ANNEX BB, CHANGES IN THE SECOND EDITION	P
EN 60950-1:2006 – COMMON MODIFICATIONS		
Contents	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZC (informative) A-deviations	--
General	Delete all the “country” notes in the reference document according to the following list: 1.4.8 Note 2 / 1.5.1 Note 2 & 3 / 1.5.7.1 Note 1.5.8 Note 2 / 1.5.9.4 Note / 1.7.2.1 Note 4, 5 & 6 2.2.3 Note / 2.2.4 Note / 2.3.2 Note 2.3.2.1 Note 2 / 2.3.4 Note 2 / 2.6.3.3 Note 2 & 3 2.7.1 Note / 2.10.3.2 Note 2 / 2.10.5.13 Note 3 3.2.1.1 Note / 3.2.4 Note 3. / 2.5.1 Note 2 4.3.6 Note 1 & 2 / 4.7 Note 4 / 4.7.2.2 Note 4.7.3.1 Note 2 / 5.1.7.1 Note 3 & 4 / 5.3.7 Note 1 6 Note 2 & 5 / 6.1.2.1 Note 2 / 6.1.2.2 Note 6.2.2 Note 6. / 2.2.1 Note 2 / 6.2.2.2 Note 7.1 Note 3 / 7.2 Note / 7.3 Note 1 & 2 G.2.1 Note 2 / Annex H Note 2	--
1.3.Z1	Add the following subclause: 1.3.Z1 Exposure to excessive sound pressure The apparatus shall be so designed and constructed as to present no danger when used for its intended purpose, either in normal operating conditions or under fault conditions, particularly providing protection against exposure to excessive sound pressures from headphones or earphones. NOTE Z1 A new method of measurement is described in EN 50332-1, Sound system equipment: Headphones and earphones associated with portable audio equipment - Maximum sound pressure level measurement methodology and limit considerations - Part 1: General method for “one package equipment”, and in EN 50332-2, Sound system equipment: Headphones and earphones associated with portable audio equipment - Maximum sound pressure level measurement methodology and limit considerations - Part 2: Guidelines to associate sets with headphones coming from different manufacturers.	N

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Clause	Requirement + Test	Result - Remark	Verdict
1.5.1	Add the following NOTE: NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2002/95/EC		P
1.7.2.1	Add the following NOTE: NOTE Z1 In addition, the instructions shall include, as far as applicable, a warning that excessive sound pressure from earphones and headphones can cause hearing loss		N
2.7.1	Replace the subclause as follows: Basic requirements To protect against excessive current, short-circuits and earth faults in PRIMARY CIRCUITS, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c): a) except as detailed in b) and c), protective devices necessary to comply with the requirements of 5.3 shall be included as parts of the equipment; b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation; c) it is permitted for PLUGGABLE EQUIPMENT TYPE B or PERMANENTLY CONNECTED EQUIPMENT, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions. If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for PLUGGABLE EQUIPMENT TYPE A the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.		P
2.7.2	This subclause has been declared 'void'.		--
3.2.3	Delete the NOTE in Table 3A, and delete also in this table the conduit sizes in parentheses.		--
3.2.5.1	Replace "60245 IEC 53" by "H05 RR-F"; "60227 IEC 52" by "H03 VV-F or H03 VVH2-F"; "60227 IEC 53" by "H05 VV-F or H05 VVH2-F2". In Table 3B, replace the first four lines by the following: | Up to and including 6 | 0,75 [a)] | | Over 6 up to and including 10 | (0,75) [b)] 1,0 | | Over 10 up to and including 16 | (1,0) [c)] 1,5 | In the conditions applicable to Table 3B delete the words "in some countries" in condition [a)]. In NOTE 1, applicable to Table 3B, delete the second sentence.		N
3.3.4	In Table 3D, delete the fourth line: conductor sizes for 10 to 13 A, and replace with the following: | Over 10 up to and including 16 | 1,5 to 2,5 | 1,5 to 4 | Delete the fifth line: conductor sizes for 13 to 16 A.		N

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4.3.13.6	Add the following NOTE: NOTE Z1 Attention is drawn to 1999/519/EC: Council Recommendation on the limitation of exposure of the general public to electromagnetic fields 0 Hz to 300 GHz. Standards taking into account this Recommendation which demonstrate compliance with the applicable EU Directive are indicated in the OJEC.	--
Annex H	Replace the last paragraph of this annex by: At any point 10 cm from the surface of the OPERATOR ACCESS AREA, the dose rate shall not exceed 1 μSv/h (0,1 mR/h) (see NOTE). Account is taken of the background level. Replace the notes as follows: NOTE These values appear in Directive 96/29/Euratom. Delete NOTE 2.	N
Biblio-graphy	Additional EN standards.	--

ZA	NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS	N

ZB	SPECIAL NATIONAL CONDITIONS	N
1.2.4.1	In **Denmark**, certain types of Class I appliances (see 3.2.1.1) may be provided with a plug not establishing earthing conditions when inserted into Danish socket-outlets.	N
1.2.13.14	In **Norway** and **Sweden**, for requirements see 1.7.2.1 and 7.3 of this annex.	N
1.5.7.1	In **Finland, Norway** and **Sweden**, resistors bridging BASIC INSULATION in CLASS I PLUGGABLE EQUIPMENT TYPE A must comply with the requirements in 1.5.7.1. In addition when a single resistor is used, the resistor must withstand the resistor test in 1.5.7.2.	N
1.5.8	In **Norway**, due to the IT power system used (see annex V, Figure V.7), capacitors are required to be rated for the applicable line-to-line voltage (230 V).	N
1.5.9.4	In **Finland**, **Norway** and **Sweden**, the third dashed sentence is applicable only to equipment as defined in 6.1.2.2 of this annex.	P

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1.7.2.1	In **Finland**, **Norway** and **Sweden**, CLASS I PLUGGABLE EQUIPMENT TYPE A intended for connection to other equipment or a network shall, if safety relies on connection to protective earth or if surge suppressors are connected between the network terminals and accessible parts, have a marking stating that the equipment must be connected to an earthed mains socket-outlet. The marking text in the applicable countries shall be as follows: In Finland: "Laite on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan" In Norway: “Apparatet må tilkoples jordet stikkontakt” In Sweden: “Apparaten skall anslutas till jordat uttag” In **Norway** and **Sweden**, the screen of the cable distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation need to be isolated from the screen of a cable distribution system. It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by e.g. a retailer. The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in: “Equipment connected to the protective earthing of the building installation through the mains connection or through other equipment with a connection to protective earthing – and to a cable distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a cable distribution system has therefore to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11).” NOTE In Norway, due to regulation for installations of cable distribution systems, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min. Translation to Norwegian (the Swedish text will also be accepted in Norway): “Utstyr som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av utstyret til kabel-TV nettet installeres en galvanisk isolator mellom utstyret og kabel- TV nettet.” Translation to Swedish: ”Utrustning som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medfőra risk főr brand. Főr att undvika detta skall vid anslutning av utrustningen till kabel-TV nät galvanisk isolator finnas mellan utrustningen och kabel-TV nätet.”		
1.7.5	In **Denmark**, socket-outlets for providing power to other equipment shall be in accordance with the Heavy Current Regulations, Section 107-2-D1, Standard Sheet DK 1-3a, DK 1-5a or DK 1-7a, when used on Class I equipment. For STATIONARY EQUIPMENT the socket-outlet shall be in accordance with Standard Sheet DK 1-1b or DK 1-5a. For CLASS II EQUIPMENT the socket outlet shall be in accordance with Standard Sheet DKA 1-4a.		N
2.2.4	In **Norway**, for requirements see 1.7.2.1, 6.1.2.1 and 6.1.2.2 of this annex.		N
2.3.2	In **Finland**, **Norway** and **Sweden** there are additional requirements for the insulation. See 6.1.2.1 and 6.1.2.2 of this annex.		N

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2.3.4	In **Norway**, for requirements see 1.7.2.1, 6.1.2.1 and 6.1.2.2 of this annex.		N
2.6.3.3	In the **United Kingdom**, the current rating of the circuit shall be taken as 13 A, not 16 A.		N
2.7.1	In the **United Kingdom**, to protect against excessive currents and short-circuits in the PRIMARY CIRCUIT of DIRECT PLUG-IN EQUIPMENT, tests according to 5.3 shall be conducted, using an external protective device rated 30 A or 32 A. If these tests fail, suitable protective devices shall be included as integral parts of the DIRECT PLUG-IN EQUIPMENT, so that the requirements of 5.3 are met.		N
2.10.5.13	In **Finland**, **Norway** and **Sweden**, there are additional requirements for the insulation, see 6.1.2.1 and 6.1.2.2 of this annex.		N
3.2.1.1	In **Switzerland**, supply cords of equipment having a RATED CURRENT not exceeding 10 A shall be provided with a plug complying with SEV 1011 or IEC 60884-1 and one of the following dimension sheets: SEV 6532-2.1991 Plug Type 15 3P+N+PE 250/400 V, 10 A SEV 6533-2.1991 Plug Type 11 L+N 250 V, 10 A SEV 6534-2.1991 Plug Type 12 L+N+PE 250 V, 10 A In general, EN 60309 applies for plugs for currents exceeding 10 A. However, a 16 A plug and socket-outlet system is being introduced in Switzerland, the plugs of which are according to the following dimension sheets, published in February 1998: SEV 5932-2.1998 Plug Type 25 3L+N+PE 230/400 V, 16 A SEV 5933-2.1998 Plug Type 21 L+N 250 V, 16 A SEV 5934-2.1998 Plug Type 23 L+N+PE 250 V, 16 A		N
3.2.1.1	In **Denmark**, supply cords of single-phase equipment having a rated current not exceeding13 A shall be provided with a plug according to the Heavy Current Regulations, Section 107-2-D1. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If poly-phase equipment and single-phase equipment having a RATED CURRENT exceeding 13 A is provided with a supply cord with a plug, this plug shall be in accordance with the Heavy Current Regulations, Section 107-2-D1 or EN 60309-2.		N
3.2.1.1	In **Spain**, supply cords of single-phase equipment having a rated current not exceeding 10 A shall be provided with a plug according to UNE 20315:1994. Supply cords of single-phase equipment having a rated current not exceeding 2,5 A shall be provided with a plug according to UNE-EN 50075:1993. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules, shall be provided with a plug in accordance with standard UNE 20315:1994. If poly-phase equipment is provided with a supply cord with a plug, this plug shall be in accordance with UNE-EN 60309-2.		--

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Clause	Requirement + Test	Result - Remark	Verdict
3.2.1.1	In the **United Kingdom**, apparatus which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord and plug, shall be fitted with a 'standard plug' in accordance with Statutory Instrument 1768:1994 - The Plugs and Sockets etc. (Safety) Regulations 1994, unless exempted by those regulations. NOTE 'Standard plug' is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.		--
3.2.1.1	In **Ireland**, apparatus which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to I.S. 411 by means of that flexible cable or cord and plug, shall be fitted with a 13 A plug in accordance with Statutory Instrument 525:1997 - National Standards Authority of Ireland (section 28) (13 A Plugs and Conversion Adaptors for Domestic Use) Regulations 1997.		N
3.2.4	In **Switzerland**, for requirements see 3.2.1.1 of this annex.		N
3.2.5.1	In the **United Kingdom**, a power supply cord with conductor of 1,25 mm2 is allowed for equipment with a rated current over 10 A and up to and including 13 A.		N
3.3.4	In the **United Kingdom**, the range of conductor sizes of flexible cords to be accepted by terminals for equipment with a RATED CURRENT of over 10 A up to and including 13 A is: • 1,25 mm^2 to 1,5 mm^2 nominal cross-sectional area.		N
4.3.6	In the **United Kingdom**, the torque test is performed using a socket outlet complying with BS 1363 part 1:1995, including Amendment 1:1997 and Amendment 2:2003 and the plug part of DIRECT PLUG-IN EQUIPMENT shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16 and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.		N
4.3.6	In **Ireland**, DIRECT PLUG-IN EQUIPMENT is known as plug similar devices. Such devices shall comply with Statutory Instrument 526:1997 - National Standards Authority of Ireland (Section 28) (Electrical plugs, plug similar devices and sockets for domestic use) Regulations, 1997.		N
5.1.7.1	In **Finland**, **Norway** and **Sweden** TOUCH CURRENT measurement results exceeding 3,5 mA r.m.s. are permitted only for the following equipment: • STATIONARY PLUGGABLE EQUIPMENT TYPE A that ○ is intended to be used in a RESTRICTED ACCESS LOCATION where equipotential bonding has been applied, for example, in a telecommunication centre; and ○ has provision for a permanently connected PROTECTIVE EARTHING CONDUCTOR; and ○ is provided with instructions for the installation of that conductor by a SERVICE PERSON; • STATIONARY PLUGGABLE EQUIPMENT TYPE B; • STATIONARY PERMANENTLY CONNECTED EQUIPMENT.		N

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Clause	Requirement + Test	Result - Remark	Verdict
6.1.2.1	In **Finland**, **Norway** and **Sweden**, add the following text between the first and second paragraph of the compliance clause: If this insulation is solid, including insulation forming part of a component, it shall at least consist of either - two layers of thin sheet material, each of which shall pass the electric strength test below, or - one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below. If this insulation forms part of a semiconductor component (e.g. an optocoupler), there is no distance through insulation requirement for the insulation consisting of an insulating compound completely filling the casing, so that CLEARANCES and CREEPAGE DISTANCES do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition - passes the tests and inspection criteria of 2.10.11 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 2.10.10 shall be performed using 1,5 kV), and - is subject to ROUTINE TESTING for electric strength during manufacturing, using a test voltage of 1,5 kV. It is permitted to bridge this insulation with a capacitor complying with EN 132400:1994, subclass Y2. A capacitor classified Y3 according to EN 132400:1994, may bridge this insulation under the following conditions: - the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 132400, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in EN 60950-1:2006, 6.2.2.1; - the additional testing shall be performed on all the test specimens as described in EN 132400; - the impulse test of 2,5 kV is to be performed before the endurance test in EN 132400, in the sequence of tests as described in EN 132400.		N
6.1.2.2	In **Finland**, **Norway** and **Sweden**, the exclusions are applicable for PERMANENTLY CONNECTED EQUIPMENT, PLUGGABLE EQUIPMENT TYPE B and equipment intended to be used in a RESTRICTED ACCESS LOCATION where equipotential bonding has been applied, e.g. in a telecommunication centre, and which has provision for a permanently connected PROTECTIVE EARTHING CONDUCTOR and is provided with instructions for the installation of that conductor by a SERVICE PERSON.		N
7.2	In **Finland**, **Norway** and **Sweden**, for requirements see 6.1.2.1 and 6.1.2.2 of this annex. The term TELECOMMUNICATION NETWORK in 6.1.2 being replaced by the term CABLE DISTRIBUTION SYSTEM.		N
7.3	In **Norway** and **Sweden**, for requirements see 1.2.13.14 and 1.7.2.1 of this annex.		N
7.3	In **Norway**, for installation conditions see EN 60728-11:2005.		N
ZC	A-DEVIATIONS (informative)		P

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Clause	Requirement + Test	Result - Remark	Verdict
1.5.1	**Sweden** (Ordinance 1990:944) Add the following: NOTE In Sweden, switches containing mercury are not permitted.		P
1.5.1	**Switzerland** (Ordinance on environmentally hazardous substances SR 814.081, Annex 1.7, Mercury - Annex 1.7 of SR 814.81 applies for mercury.) Add the following: NOTE In Switzerland, switches containing mercury such as thermostats, relays and level controllers are not allowed.		P
1.7.2.1	**Denmark** (Heavy Current Regulations) Supply cords of CLASS I EQUIPMENT, which is delivered without a plug, must be provided with a visible tag with the following text: Vigtigt! Lederen med grøn/gul isolation må kun tilsluttes en klemme mærket  eller  If essential for the safety of the equipment, the tag must in addition be provided with a diagram, which shows the connection of the other conductors, or be provided with the following text: “For tilslutning af de øvrige ledere, se medfølgende installationsvejledning.”		N
1.7.2.1	**Germany** (Gesetz über technische Arbeitsmittel und Verbraucherprodukte (Geräte- und Produktsicherheitsgesetz – GPSG) [Law on technical labour equipment and consumer products], of 6th January 2004, Section 2, Article 4, Clause (4), Item 2). If for the assurance of safety and health certain rules during use, amending or maintenance of a technical labour equipment or readymade consumer product are to be followed, a manual in German language has to be delivered when placing the product on the market. Of this requirement, rules for use even only by SERVICE PERSONS are not exempted.		P
1.7.5	**Denmark** (Heavy Current Regulations) With the exception of CLASS II EQUIPMENT provided with a socket outlet in accordance with the Heavy Current Regulations, Section 107-2-D1, Standard Sheet DK 1-4a, CLASS II EQUIPMENT shall not be fitted with socket-outlets for providing power to other equipment.		N
1.7.13	**Switzerland** (Ordinance on chemical hazardous risk reduction SR 814.81, Annex 2.15 Batteries) Annex 2.15 of SR 814.81 applies for batteries.		N
5.1.7.1	**Denmark** (Heavy Current Regulations, Chapter 707, clause 707.4) TOUCH CURRENT measurement results exceeding 3,5 mA r.m.s. are permitted only for PERMANENTLY CONNECTED EQUIPMENT and PLUGGABLE EQUIPMENT TYPE B.		N

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Clause	Requirement + Test	Result - Remark	Verdict

1.5.1	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity[1])
Top panel	CHIMEI	PA765A	V-0, Min 80℃, Min thickness 2.1mm	UL94	UL E56070
(Alternate)	LG	AF312C	V-0, Min 70℃, Min thickness 2.5mm	UL94	UL E67171
Metal enclosure	--	Painted steel	Min 1.5 mm thickness	--	--
Main transformer (for model APC1024E)	CSCCN	080-49907-00	Class H	--	Tested with equipment
Main transformer (for model APC2024E)	CSCCN	080-49882-00	Class H	--	Tested with equipment
Main transformer (for model APC3024E)	CSCCN	080-49902-00	Class H	--	Tested with equipment
Main transformer (for model APC4024E)	CSCCN	080-49883-00	Class H	--	Tested with equipment
Main transformer (for model APC5024E)	CSCCN	080-49901-00	Class H	--	Tested with equipment
Main transformer (for model APC6024E)	CSCCN	080-49901-00	Class H	--	Tested with equipment
Current transformer (CT1)	Click	080-20338-00	Class B	--	Tested with equipment
Transformer (TX06)	Click	080-49851-00A	Class B	--	Tested with equipment
Terminal block	GOSUN	GSS500	--	--	Tested with equipment
Input G, L and n wire	Various	1015	10AWG, 105	--	UL
Input/output breaker	KUOYUH	98 Series	125/250VAC 50/60Hz, 30A	--	TUV, UL

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Clause	Requirement + Test	Result - Remark	Verdict

DC Fan	JAMICON, Kaimei electronic corp.	JF0925H1UMAR	12V, 0.42A	--	TUV, UL
Capacitor (C17, C32)	Various	Various	X2 type, 2.2uF, 275Vac	IEC 60384-14	VDE
Choke (L2)	Click	082-10205-00	130℃	--	Tested with equipment
Capacitor (C9, C10, C18, C19, C30, C34)	Various	Various	Y2 type, 10000pF, 250Vac	IEC 60384-14	VDE
Relay (RY01)	SONG CHUAN	855AP-1A-C	250V, 30A, Coil 12V	--	TUV, UL
PCB	Various	Various	V-0, 130℃	--	UL
Switch	Zhang Jia Gang Hua Feng Electronic Connector & Component Co. Ltd	HF-606	250V, 6A	VDE 0630	VDE, CSA, UL
[1]) An asterisk indicates a mark which assures the agreed level of surveillance					
Supplementary information:					

1.6.2	TABLE: Electrical data (in normal conditions)					P
U (V)	I (A)	Irated (A)	P (W)	Fuse #	Ifuse (A)	Condition/status
Tested on model APC6024E						
198V/ 50Hz	30.4	--	6266	Breaker	--	Charging of empty batteries and rated output load.
220/ 50Hz	27.5	40	6288	Breaker	--	Charging of empty batteries and rated output load.
240V/ 50Hz	24.8	40	6232	Breaker	--	Charging of empty batteries and rated output load.
264V/ 50Hz	24.2	--	6238	Breaker	--	Charging of empty batteries and rated output load.
198V/ 60Hz	30.4	--	6251	Breaker	--	Charging of empty batteries and rated output load.
220/ 60Hz	27.4	40	6270	Breaker	--	Charging of empty batteries and rated output load.
240V/ 60Hz	24.8	40	6235	Breaker	--	Charging of empty batteries and rated output load.
264V/ 60Hz	24.2	--	6242	Breaker	--	Charging of empty batteries and rated output load.
Tested on model APC5024E						

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Clause	Requirement + Test	Result - Remark	Verdict

198V/ 50Hz	25.6	--	5283	Breaker	--	Charging of empty batteries and rated output load.
220/ 50Hz	23.1	40	5224	Breaker	--	Charging of empty batteries and rated output load.
240V/ 50Hz	20.9	40	5236	Breaker	--	Charging of empty batteries and rated output load.
264V/ 50Hz	20.1	--	5221	Breaker	--	Charging of empty batteries and rated output load.
198V/ 60Hz	25.6	--	5275	Breaker	--	Charging of empty batteries and rated output load.
220/ 60Hz	23.1	40	5230	Breaker	--	Charging of empty batteries and rated output load.
240V/ 60Hz	20.9	40	5225	Breaker	--	Charging of empty batteries and rated output load.
264V/ 60Hz	20.1	--	5221	Breaker	--	Charging of empty batteries and rated output load.
Tested on model APC4024E						
198V/ 50Hz	20.7	--	4267	Breaker	--	Charging of empty batteries and rated output load.
220/ 50Hz	18.6	30	4288	Breaker	--	Charging of empty batteries and rated output load.
240V/ 50Hz	17.0	30	4295	Breaker	--	Charging of empty batteries and rated output load.
264V/ 50Hz	16.5	--	4308	Breaker	--	Charging of empty batteries and rated output load.
198V/ 60Hz	20.7	--	4259	Breaker	--	Charging of empty batteries and rated output load.
220/ 60Hz	18.6	30	4273	Breaker	--	Charging of empty batteries and rated output load.
240V/ 60Hz	17.1	30	4282	Breaker	--	Charging of empty batteries and rated output load.
264V/ 60Hz	16.5	--	4301	Breaker	--	Charging of empty batteries and rated output load.
Tested on model APC3024E						
198V/ 50Hz	15.8	--	3282	Breaker	--	Charging of empty batteries and rated output load.
220/ 50Hz	14.1	30	3242	Breaker	--	Charging of empty batteries and rated output load.
240V/ 50Hz	12.7	30	3235	Breaker	--	Charging of empty batteries and rated output load.
264V/ 50Hz	12.1	--	3238	Breaker	--	Charging of empty batteries and rated output load.
198V/ 60Hz	15.8	--	3265	Breaker	--	Charging of empty batteries and rated output load.

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Clause	Requirement + Test	Result - Remark	Verdict

220/ 60Hz	14.1	30	3222	Breaker	--	Charging of empty batteries and rated output load.
240V/ 60Hz	12.7	30	3225	Breaker	--	Charging of empty batteries and rated output load.
264V/ 60Hz	12.1	--	3228	Breaker	--	Charging of empty batteries and rated output load.
Tested on model APC2024E						
198V/ 50Hz	11.1	--	2261	Breaker	--	Charging of empty batteries and rated output load.
220/ 50Hz	9.95	20	2282	Breaker	--	Charging of empty batteries and rated output load.
240V/ 50Hz	9.1	20	2294	Breaker	--	Charging of empty batteries and rated output load.
264V/ 50Hz	8.8	--	2302	Breaker	--	Charging of empty batteries and rated output load.
198V/ 60Hz	11.1	--	2258	Breaker	--	Charging of empty batteries and rated output load.
220/ 60Hz	9.95	20	2270	Breaker	--	Charging of empty batteries and rated output load.
240V/ 60Hz	9.1	20	2289	Breaker	--	Charging of empty batteries and rated output load.
264V/ 60Hz	8.8	--	2306	Breaker	--	Charging of empty batteries and rated output load.
Tested on model APC1024E						
198V/ 50Hz	6.18	--	1261	Breaker	--	Charging of empty batteries and rated output load.
220/ 50Hz	5.57	10	1264	Breaker	--	Charging of empty batteries and rated output load.
240V/ 50Hz	5.04	10	1274	Breaker	--	Charging of empty batteries and rated output load.
264V/ 50Hz	5.01	--	1278	Breaker	--	Charging of empty batteries and rated output load.
198V/ 60Hz	6.17	--	1256	Breaker	--	Charging of empty batteries and rated output load.
220/ 60Hz	5.55	10	1258	Breaker	--	Charging of empty batteries and rated output load.
240V/ 60Hz	5.03	10	1267	Breaker	--	Charging of empty batteries and rated output load.
264V/ 60Hz	4.99	--	1269	Breaker	--	Charging of empty batteries and rated output load.
Supplementary information:						

1.7.11	TABLE: durability of marking test	P

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Clause	Requirement + Test	Result - Remark	Verdict

Location	Checked by	Times	Result
External enclosure	Water	15s	No any curling and still legibility
External enclosure	Petroleum spirit	15s	No any curling and still legibility
Supplementary information:			

2.1.1.5 c1)	TABLE: max. V, A, VA test (Energy hazardous measurement)			N
Voltage (rated) (V)	Current (rated) (A)	Voltage (max.) (V)	Current (max.) (A)	VA (max.) (VA)
Supplementary information: Battery terminal				

2.1.1.5 c2)	TABLE: stored energy (Energy hazardous measurement)	N
Capacitance C (µF)	Voltage U (V)	Energy E (J)
Supplementary information:		

2.1.1.7	TABLE: Capacitance discharge test		P
Condition	τ calculated (s)	τ measured (s)	Comments
L-N	--	2.80ms	Vp=360V, 37%Vp=133.2V
Supplementary information: Supplied with 264V/50Hz, test without load. Tested on model APC6024E			

2.2	TABLE: evaluation of voltage limiting components in SELV circuits		P
Component (measured between)	max. voltage (V) (normal operation)		Voltage Limiting Components
	V peak	V d.c.	
Charger winding of main transformer	42.0V	--	--
Secondary winding of current transfomrer CT1	8.7V	--	--
Fault test performed on voltage limiting components	Voltage measured (V) in SELV circuits (V peak or V d.c.)		
Charger winding of main transformer, s-c	0V		

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Clause	Requirement + Test	Result - Remark	Verdict

Secondary winding of current transfomrer CT1, s-c	0V
Supplementary information: S-c=Short circuit. Tested on model APC6024E	

2.4.2	TABLE: Limited current circuit measurement				P
Location : L-N of input					
Condition	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments
Normal	2.36V	1.18	48.5	33.95	A 2000 ohm non-inductive resistor used for Frequency > 1kHz, Annex D used for 60Hz
Q04 c-e shorted	2.4V	1.2	48.5	33.95	Ditto
Location : L-G of input					
Condition	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments
Normal	5.5	2.75	50	35	A 2000 ohm non-inductive resistor used for Frequency > 1kHz, Annex D used for 60Hz
Q04	5.0	2.5	50	35	Ditto
Location : N-G of input					
Condition	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments
Normal	7.28	3.64	50	35	A 2000 ohm non-inductive resistor used for Frequency > 1kHz, Annex D used for 60Hz
Q04 c-e shorted	7.4	3.7	50	35	Ditto
Supplementary information: Supplied with 264V/50Hz. Tested on model APC6024E					

2.5	TABLE: limited power sources			N
Circuit output tested:				
Measured Uoc (V) with all load circuits disconnected: Uoc=				
Measuring position	I_{sc}(A)		VA	
	Meas.	Limit	Meas.	Limit
Supplementary information: S-c=Short circuit, O-c=Open circuit				

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Clause	Requirement + Test	Result - Remark	Verdict

2.6.3.4	TABLE: ground continue test				P
Location		Resistance measured (mΩ)	Voltage measured (V)	Current applied (A)	Duration (min)
G pin of Inlet to earthing enclosure		7	0.224	32	120
Supplementary information: Tested on model PSW7 6048E					

2.10.2	TABLE: determination of operating voltage measurement				N
Component	Location		Peak Voltage (Vac)	RMS Voltage (Vac)	Comments
	From	To			
Supplementary information:					

2.10.3 and 2.10.4	TABLE: Clearance and creepage distance measurements					P
Clearance (cl) and creepage distance (cr) at/of/between:	U peak (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)
Line and neutral trace under C17	<420	<250	2.0	6.2	2.5	6.2
Line and neutral trace under C20	<420	<250	2.0	6.5	2.5	6.5
Primary trace to earthed trace	<420	<250	2.0	>2.5	2.5	>2.5
Primary component to chassis	<420	<250	2.0	>5	2.5	>5
Primary trace to secondary trace under CT1	<420	<250	4.0	8.3	5.0	8.3
Primary trace to secondary trace under RY1	<420	<250	4.0	8.4	5.0	8.4
Coil to contacts of RY1 for reinforce insulation	<420	<250	4.0	>5.0	5.0	>5.0
Supplementary information: 1. See appended table C.2 for internal distances of transformer. 2. 10 N Test performed component and internal wire.						

2.10.5	TABLE: Distance through insulation measurements	P

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Clause	Requirement + Test	Result - Remark	Verdict

Distance through insulation (DTI) at/of:	U peak (V)	U rms (V)	Test voltage (V)	Required DTI (mm)	DTI (mm)
Relay enclosure (reinforced insulation)	<420	<250	3000	0.4	≥0.4[1)]
CT1 tube(reinforced insulation)	<420	<250	3000	0.4	≥0.4[1)]
Supplementary information: 1) Approved component. For details refer to CDF					

4.3.8	TABLE: Batteries								N
The tests of 4.3.8 are applicable only when appropriate battery data is not available									N
Is it possible to install the battery in a reverse polarity position?									N
	Non-rechargeable batteries			Rechargeable batteries					
	Discharging		Un-intentional charging	Charging		Discharging		Reversed charging	
	Meas. current	Manuf. Specs.		Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.
Max. current during normal condition	--	--	--	--	--	--	--	--	--
Max. current during fault condition	--	--	--	--	--	--	--	--	--

Test results:		Verdict
- Chemical leaks		N
- Explosion of the battery		N
- Emission of flame or expulsion of molten metal		N
- Electric strength tests of equipment after completion of tests		N
Supplementary information:		

4.5	TABLE: Thermal requirements						P
	Supply voltage (V) ……………….:	198V	264V	Dis-charge mode	--	--	–
	Ambient T_{min}(°C) ……………….:	--	--	--	--	--	–
	Ambient T_{max}(°C) ……………….:	--	--	--	--	--	–

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Clause	Requirement + Test	Result - Remark	Verdict

Maximum measured temperature T of part/at:	T (°C)					Allowed T_{max} (°C)
Tested on model APC6024E						
Input terminal block	31.1	28.6	40.8	--	--	105
Battery terminal	31.4	31.3	26.1	--	--	105
Input breaker	31.4	32.2	30.9	--	--	85
Input “L” wire	47.6	41.1	31.0	--	--	105
Battery wire (red)	47.7	43.9	30.0	--	--	105
Top panel	28.2	28.6	28.5	--	--	95
Top metal enclosure	32.8	31.3	29.0	--	--	75
RY01 coil	67.9	64.7	33.4	--	--	130
L2 coil	71.5	70.1	30.2	--	--	130
Y2-Capacitor C19	56.9	54.5	29.8	--	--	85
X2-Capacitor C20	37.7	37.5	31.5	--	--	100
TX06 winding	42.0	41.9	38.5	--	--	110
CT1 winding	45.0	43.2	40.6	--	--	110
PCB near Q2	32.9	29.6	46.6	--	--	130
Y2-Capacitor C9	29.7	28.6	30.3	--	--	85
Y2-Capacitor C10	30.5	29.2	29.6	--	--	85
PCB near Q5	32.2	31.9	47.5	--	--	130
The primary winding of main transformer 1	40.7	38.5	42.8	--	--	110
The secondary winding of main transformer 1	40.4	38.0	42.5	--	--	110
The core of main transformer 1	48.7	46.9	42.3	--	--	--
The primary winding of main transformer 2	35.7	34.5	35.2	--	--	110
The secondary winding of main transformer 2	35.6	34.5	36.5	--	--	110
Ambient	24.0	24.2	22.3	--	--	--
Tested on model APC3024E						
Input terminal block	29.9	29.6	41.8	--	--	105
Battery terminal	30.6	31.2	27.0	--	--	105
Input breaker	31.4	32.2	30.9	--	--	85
Input “L” wire	47.4	41.2	31.2	--	--	105
Battery wire (red)	47.5	44.1	31.0	--	--	105
Top panel	28.1	28.7	28.8	--	--	95
Top metal enclosure	32.9	31.6	30.0	--	--	75
RY01 coil	68.4	65.8	35.6	--	--	130
L2 coil	72.6	71.8	31.6	--	--	130
Y2-Capacitor C19	57.9	55.3	28.7	--	--	85

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Clause	Requirement + Test	Result - Remark	Verdict

X2-Capacitor C20	36.7	37.3	31.4	--	--	100
TX06 winding	43.1	42.9	39.2	--	--	110
CT1 winding	44.2	42.2	40.2	--	--	110
PCB near Q2	32.4	30.6	45.4	--	--	130
Y2-Capacitor C9	28.7	29.4	31.3	--	--	85
Y2-Capacitor C10	30.8	29.4	30.1	--	--	85
PCB near Q5	34.4	31.5	46.7	--	--	130
The primary winding of main transformer	41.2	39.4	41.3	--	--	110
The secondary winding of main transformer	39.6	37.5	41.0	--	--	110
The core of main transformer	47.5	45.4	41.8	--	--	--
Ambient	24.4	24.6	24.0	--	--	--
Supplementary information:						

Temperature T of winding:	t_1 (°C)	R_1 (Ω)	t_2 (°C)	R_2 (Ω)	T (°C)	Allowed T_{max} (°C)	Insulation class

Supplementary information:

1) T shall not exceed (Tmax + Tamb – Tma), see clause 1.4.12.

   T: is the temperature of the given part measured under the prescribed test conditions;

   Tmax: is the maxnmum temperature specified for compliance with the test;

   Tamb: is the ambient temperature during test;

   Tma: is the maximum ambient temperature during permitted by the manufacturer's specification, see below 2).

2) The maximum ambient temperature is 40℃.

4.5.5	TABLE: Ball pressure test of thermoplastic parts		P
	Allowed impression diameter (mm) .... :	≤ 2 mm	–

Part	Test temperature (°C)	Impression diameter (mm)
CT1 Bobbin	125	0.8
Input terminal block	125	0.8
Battery terminal	125	1.2
Supplementary information:		

4.7	TABLE: Resistance to fire				P
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class	Evidence

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Clause	Requirement + Test	Result - Remark	Verdict

Top panel					
Supplementary information:					

4.6.1 and 4.6.2	TABLE: openings		P
Location	Size (mm)	Comments	
Top	None	No openings	
Bottom	None	No openings	
Side	2.9mm Max.	960 provided	
Front	None	No openings	
Back	--	Only DC fan ventilation openings provided on back. Metal net provide as fan guard.	
Supplementary information:			

5.1.6	TABLE: touch current measurement			P
Measured between:	Measured (mA)	Limit (mA)	Comments/conditions	
Live – Enclosure	2.1	3.5	Normal load condition.	
Neutral – Enclosure	2.1	3.5	Normal load condition.	
Live – secondary circuit	0.07	0.25	Normal load condition.	
Neutral –secondary circuit	0.06	0.25	Normal load condition.	
supplementary information: Vin =264V, Tested on model APC6024E				

5.2	TABLE: Electric strength tests, impulse tests and voltage surge tests			P
Test voltage applied between:	Voltage shape (AC, DC, impulse, surge)	Test voltage (V)	Breakdown Yes/No	
Primary circuit and secondary circuit	AC	3000	No	
Primary circuit and enclosure	AC	1500	No	
Primary winding and secondary winding of main tranformer	AC	3000	No	
Primary winding and core of main tranformer	AC	1500	No	
Primary winding and secondary winding of CT1	AC	3000	No	
Primary winding and core of CT1	AC	3000	No	
2 layers insulating tape used in CT1 transformer	AC	3000	No	
1 layers insulating tape used in main transformer	AC	3000	No	
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

5.3	TABLE: Fault condition tests					P
	Ambient temperature (°C) ....:	25, if not specify.				–
	Power source for EUT: Manufacturer, model/type, output rating ....:	APC6024E, Refer to page 2.				–
Component No.	Fault	Supply voltage (V)	Test time	Fuse #	Fuse current (A)	Observation
Q04 c-e	s-c	Battery mode	10min	Breaker	--	Normal operation, no damage, no hazards.
Secondary winding of CT1	s-c	240V	10min	Breaker	27.5	Normal operation, no damage, no hazards.
Charger winding of Main transformer	s-c	240V	10min	Breaker	0.8	UPS transfer to fault mode, no output. No hazard.
D30	s-c	240V	1s	Breaker	0	Unit shutdown. No hazard.
D28	s-c	240V	1s	Breaker	0	Unit shutdown. No hazard.
C5	s-c	Battery mode	1s	--	--	Unit shutdown. No hazard.
Q10 d-s	s-c	240V	10min	Breaker	--	UPS transfer to fault mode, no output. No hazard.
Q21	s-c	Battery mode	1s	Breaker	--	Q15, Q19, Q7, Q2, Q11, Q12, Q8, Q16, Q4, Q20, Q32, Q17, Q13, Q6, Q18 and Q14 damaged. no output. No hazard.
Battery terminal	s-c	Battery mode	1s	--	--	Unit shutdown. No hazard.
AC output	o-l	240V	2h	Breaker	--	UPS shutdown when loaded to 112% rated load. Maximum temperature was: Main transformer primary winding = 40.0°C, Main transformer secondary winding = 42.1°C, CT1 winding = -43.7°C, ambient = 23.4°C. No hazard.
AC output	o-l	Battery mode	--	--	--	UPS shutdown when loaded to 125% rated load. Maximum temperature was: Main transformer primary winding = 45.3°C, Main transformer secondary winding = 48.2°C, CT1 winding = -42.0°C, ambient = 24.1°C. No hazard.
AC output	s-c	240V	1s	Breaker	--	UPS transfer to fault mode, cann't recoveable, no hazards.
AC output	s-c	Battery mode	1s	--	--	UPS transfer to fault mode, recoveable, no hazards.

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Clause	Requirement + Test	Result - Remark	Verdict

Openings	Blocked	240V	2h	Breaker	27.6	Normal operation, no damage, no hazards. Maximum temperature was: Main transformer primary winding = 37.0°C, Main transformer secondary winding = 36.1°C, CT1 winding = -45.7°C, ambient = 23.4°C. No hazard.
Openings	Blocked	Battery mode	--	--	--	UPS discharge till stutdown. No hazards. Maximum temperature was: Main transformer primary winding = 37.3°C, Main transformer secondary winding = 38.2°C, CT1 winding = -46.0°C, ambient = 23.5°C. No hazard.
Fan	Locked	240V	1s	Breaker	27.5	Normal operation, no damage, no hazards. Maximum temperature was: Main transformer primary winding = 60.8°C, Main transformer secondary winding = 61.8°C, CT1 winding = -46.0°C, ambient = 24.0°C. No hazard.
Fan	Locked	Battery mode	--	--	--	UPS discharge till stutdown. No hazards. Maximum temperature was: Main transformer primary winding = 52.3°C, Main transformer secondary winding = 53.0°C, CT1 winding = -44.7°C, ambient = 23.8°C. No hazard.
Supplementary information: s-c=short circuit, o-c=open circuit, o-l=overload Ater all fault condition test, the samples passed the dielectric voltage test.						

C.2	TABLE: transformers						P
Loc.	Tested insulation	Working voltage peak / V (2.10.2)	Working voltage rms / V (2.10.2)	Required electric strength (5.2)	Required clearance / mm (2.10.3)	Required creepage distance / mm (2.10.4)	Required distance thr. insul. (2.10.5)
Main transfo mer	Reinforced	<420	<250	3000Vac	4.0	5.0	*
Main transfo mer	Basic	<420	<250	1500Vac	2.0	2.5	*
CT1	Reinforced	<420	<250	3000Vac	4.0	5.0	*
Loc.	Tested insulation			Test voltage/ V	Measured clearance / mm	Measured creepage dist./ mm	Measured distance thr. insul. / mm; number of layers

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Clause	Requirement + Test	Result - Remark	Verdict

Main transfo mer	Reinforced: Primary - Secondary	3000Vac	>5.0	>5.0	2 layers
Main transfo mer	Basic: Primary / core-Secondary	1500Vac	>2.5	>2.5	2 layers
CT1	Reinforced: Primary - Secondary	3000Vac	>5.0	>5.0	>0.4
CT1	Reinforced: Primary - core	3000Vac	>5.0	>5.0	>0.4
supplementary information: * 2 layers or 3 layers or Annex U					

Pictures

Fig. 1 Overview for model APC6024E (1)

Fig. 2 Overview for model APC6024E (2)

Pictures

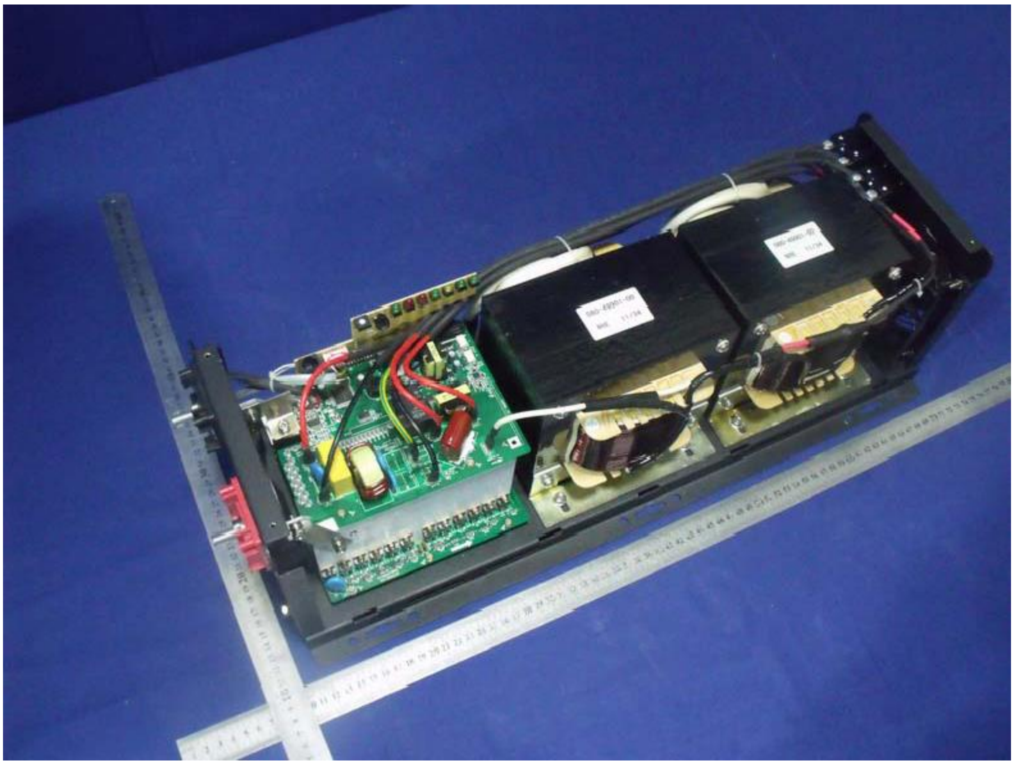

Fig. 3 Inside view for model APC6024E

Fig. 4 PCB for model APC6024E, components side view

Pictures

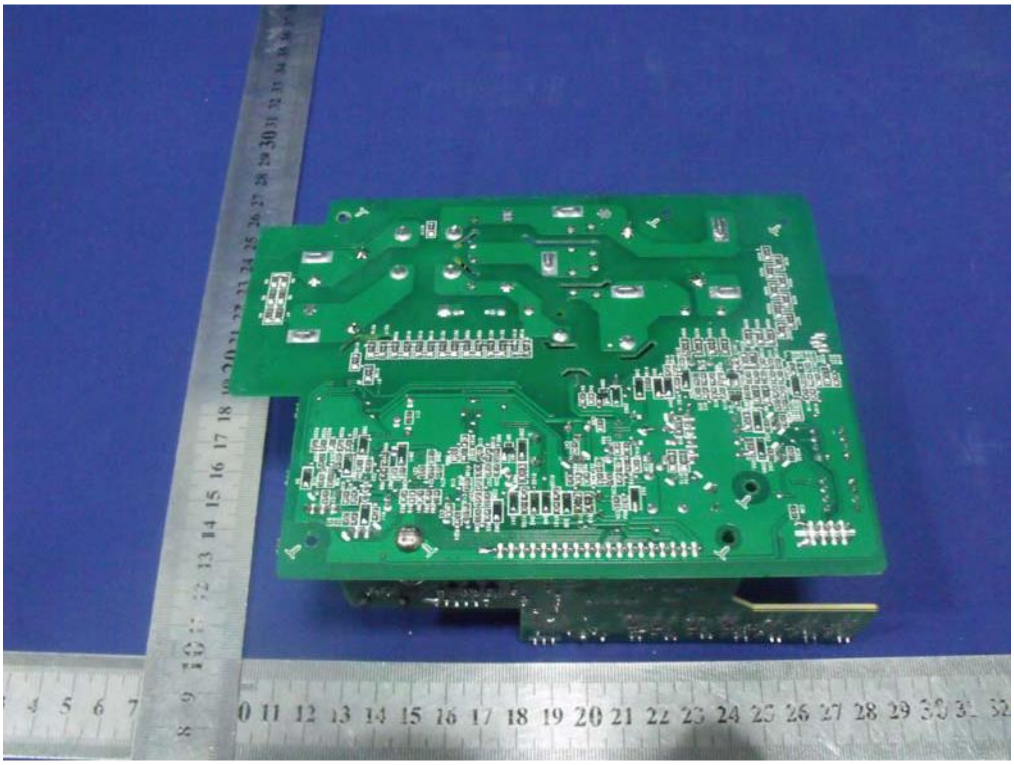

Fig. 5 PCB for model APC6024E, traces side view

APPLICATION FOR LOW VOLTAGE DIRECTIVE

On Behalf of

Tortech Pty Ltd

Inverter

Model(s): APC2048E, APC3048E, APC4048E, APC5048E, APC6048E

Prepared By : SHENZHEN EMTEK CO., LTD.
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TEST REPORT
EN 60950-1
Information technology equipment – Safety – Part 1: General requirements

Report Reference No. ....:	ES111008007S	Paladin Hu
Compiled by (name + signature)......:	Paladin Hu	William Guo
Approved by (name + signature) .....:	William Guo	
Date of issue ....:	October 28, 2011	
Total number of pages ....:	57 pages	
Testing Laboratory		
Name ....:	SHENZHEN EMTEK CO., LTD.	
Address ....:	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China	
Testing location / address ....:	Same as above	
Applicant's name ....:	Tortech Pty Ltd	
Test specification:		
Standard...:	EN 60950-1:2006+A11:2009	
Test procedure ....:	Compliance with EN 60950-1:2006+A11:2009	
Non-standard test method…………..:	N/A	
Test item description........................:	Inverter	
Model/Type reference ....:	APC2048E, APC3048E, APC4048E, APC5048E, APC6048E	

Ratings .... :	For model APC2048E: INPUT: 220-240V~, 50/60Hz, 20A MAX, 1Ø OUTPUT: 220-240V~, 50/60Hz, 2000W, 1Ø BATTERY: 48VDC For model APC3048E: INPUT: 220-240V~, 50/60Hz, 30A MAX, 1Ø OUTPUT: 220-240V~, 50/60Hz, 3000W, 1Ø BATTERY: 48VDC For model APC4048E: INPUT: 220-240V~, 50/60Hz, 30A MAX, 1Ø OUTPUT: 220-240V~, 50/60Hz, 4000W, 1Ø BATTERY: 48VDC For model APC5048E: INPUT: 220-240V~, 50/60Hz, 40A MAX, 1Ø OUTPUT: 220-240V~, 50/60Hz, 5000W, 1Ø BATTERY: 48VDC For model APC6048E: INPUT: 220-240V~, 50/60Hz, 40A MAX, 1Ø OUTPUT: 220-240V~, 50/60Hz, 6000W, 1Ø BATTERY: 48VDC

Copy of marking plate:

1. Rating label for model APC2048E:

Inverter
Model APC2048E
INPUT: 220-240V~, 50/60Hz, 20A MAX, 1Ø
OUTPUT: 220-240V~, 50/60Hz, 2000W, 1Ø
BATTERY: 48V⎓
Made In China

2. Rating label for model APC3048E:

Inverter
Model APC3048E
INPUT: 220-240V~, 50/60Hz, 30A MAX, 1Ø
OUTPUT: 220-240V~, 50/60Hz, 3000W, 1Ø
BATTERY: 48V⎓
Made In China

3. Rating label for model APC4048E:

Inverter
Model APC4048E
INPUT: 220-240V~, 50/60Hz, 30A MAX, 1Ø
OUTPUT: 220-240V~, 50/60Hz, 4000W, 1Ø
BATTERY: 48V⎓
Made In China

4. Rating label for model APC5048E:

Inverter
Model APC5048E
INPUT: 220-240V~, 50/60Hz, 40A MAX, 1Ø
OUTPUT: 220-240V~, 50/60Hz, 5000W, 1Ø
BATTERY: 48V⎓

Made In China

5. Rating label for model APC6048E:

Inverter
Model APC6048E
INPUT: 220-240V~, 50/60Hz, 40A MAX, 1Ø
OUTPUT: 220-240V~, 50/60Hz, 6000W, 1Ø
BATTERY: 48V⎓

Made In China

Test item particulars	
Equipment mobility...:	☐ movable ☐ hand-held ☐ transportable ☒ stationary ☐ fixed ☐ direct plug-in ☐ for building-in
Connection to the mains ....:	☐ pluggable equipment ☐type A ☐type B ☒ permanent connection
Operating condition...:	☒ continuous ☐ short-time ☐ intermittent
Over voltage category ....:	☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV
Mains supply tolerance (%)................................:	220Vac(-10%), 240Vac(+10%)
Tested for IT power systems ....:	☐ Yes ☒ No
IT testing, phase-phase voltage (V) ....:	N/A
Class of equipment ....:	☒ Class I ☐ Class II ☐ Class III ☐ Not classified
Mass of equipment (kg) ....:	>18kg
Pollution degree ....:	☒ PD 2 ☐ PD 3
IP protection class ....:	IP20
Possible test case verdicts:	
- test case does not apply to the test object ....:	N (N/A)
- test object does meet the requirement.......................:	P (Pass)
- test object does not meet the requirement.................:	F (Fail)
Testing	
Date of receipt of test item ....:	October 11, 2011
Date(s) of performance of tests ....:	October 12, 2011 to October 28, 2011

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

General product information:

The equipment is a inverter for general use with information technology equipment.

Double/reinforced insulation provided between primary circuits and SELV circuits by safety isolation transformer (main transformer, current transformer CT1), Relay (RY01) and sufficient clearances and creepage distances within the unit.

Model difference description:

1. Model APC2048E is similar to model APC3048E except for main transformer, some components etc.
2. Models APC4048Eand APC5048E are similar to model APC6048E except for main transformer, some components etc.

Summary of testing:

The product has been tested according to standard EN 60950-1:2006+A11:2009

- Tests performed on the bench
- Maximum ambient temperature: +40°C
- Tested for tropical conditions
- EUT is designed for altitudes not exceeding 2000 m.

This series of Inverter generally uses the same circuit diagrams. Unless otherwise specified, the tests are conducted on models APC6048E and APC3048E considered the worst condition.

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict

1	GENERAL		P
1.5	Components		P
1.5.1	General		P
	Comply with IEC 60950 or relevant component standard	Components, which were found to affect safety aspects comply with the requirements of this aspects of the relevant IEC component standards. (see appended table 1.5.1)	P
1.5.2	Evaluation and testing of components	Components, which are certified to IEC or national standards, are applied correctly within their ratings. Components not covered by IEC standards are tested under the conditions present in the equipment.	P
1.5.3	Thermal controls	No thermal controls provided.	N
1.5.4	Transformers	Transformers used are suitable for their intended application and comply with the relevant requirements of the standard.	P
1.5.5	Interconnecting cables	Interconnecting cables are suitable for their intended application and comply with the relevant requirements of the standard.	P
1.5.6	Capacitors bridging insulation	X1 or X2 capacitors according to IEC 60384- 14:1993. (see appended table 1.5.1)	P
1.5.7	Resistors bridging insulation		P
1.5.7.1	Resistors bridging functional, basic or supplementary insulation	No such parts.	N

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict

1.5.7.2	Resistors bridging double or reinforced insulation between a.c. mains and other circuits	Double/ reinforced insulation bridged by following resistors: 1. R177, R199, R219, R218, R196, R197, R209, R208, R188, R184, R185, R186, R206, R207, R189, R205 (I/P “N”) (499kΩ) 2. R180, R191, R214, R213, R201, R202, R212, R215, R190, R181, R187, R200, R217, R216, R192, R198 (I/P “L”) (499kΩ) 3. R265, R249, R255, R244, R266, R270, R256, R271, R237, R269, R234, R236, R267, R254, R235, R204 (O/P “N”) (499kΩ) 4. R231, R240, R261, R260, R247, R248, R259, R262, R241, R232, R233, R248, R264, R263, RR239, R203 (O/P “L”) (499KΩ)	P
1.5.7.3	Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable		N
1.5.7.4	Accessible parts	See 2.4	P
1.5.8	Components in equipment for IT power systems	TN power system.	P
1.5.9	Surge suppressors	No such parts.	N
1.5.9.1	General		N
1.5.9.2	Protection of VDRs		N
1.5.9.3	Bridging of functional insulation by a VDR	No such parts.	N
1.5.9.4	Bridging of basic insulation by a VDR	No such parts.	N
1.5.9.5	Bridging of supplementary, double or reinforced insulation by a VDR	No such parts.	N

1.6	Power interface		P
1.6.1	AC power distribution systems	For connection to TN power system.	P
1.6.2	Input current	(see appended table 1.6.2)	P
1.6.3	Voltage limit of hand-held equipment	This appliance is not a hand-held equipment.	N
1.6.4	Neutral conductor	Basic insulation of rated voltage between primary phase and neutral.	P

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.7	Marking and instructions		P
1.7.1	Power rating	See below.	P
	Rated voltage(s) or voltage range(s) (V) .... :	220-240V~	P
	Symbol for nature of supply, for d.c. only.............. :	AC source	P
	Rated frequency or rated frequency range (Hz) ... :	50/60Hz	P
	Rated current (mA or A) .... :	See rating label	P
	Manufacturer's name or trade-mark or identification mark .... :	EYEN	P
	Model identification or type reference .... :	APC2048E, APC3048E, APC4048E, APC5048E, APC6048E	P
	Symbol for Class II equipment only .... :	Class I equipment.	N
	Other markings and symbols .... :	There is no additional marking.	N
1.7.2	Safety instructions and marking	The user manual contains information for operation, installation, servicing transport, storage and technical data.	P
1.7.2.1	General		P
1.7.2.2	Disconnect devices	The installation instructions are state that: "For PERMANENTLY CONNECTED EQUIPMENT, a readily accessible disconnect device shall be incorporated external to the equipment."	P
1.7.2.3	Overcurrent protective device		P
1.7.2.4	IT power distribution systems	TN power distribution systems	N
1.7.2.5	Operator access with a tool	All areas containing hazard(s) are inaccessible to the operator.	P
1.2.7.6	Ozone	The equipment does not produce Ozone.	N
1.7.3	Short duty cycles	Equipment is designed for continuous operation.	N
1.7.4	Supply voltage adjustment .... :	No voltage selector.	N
	Methods and means of adjustment; reference to installation instructions .... :		N
1.7.5	Power outlets on the equipment .... :	No outlet provided	N
1.7.6	Fuse identification (marking, special fusing characteristics, cross-reference) .... :	Circuit breaker provided	N
1.7.7	Wiring terminals	See below	P

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Clause	Requirement + Test	Result - Remark	Verdict
1.7.7.1	Protective earthing and bonding terminals .... :		P
1.7.7.2	Terminals for a.c. mains supply conductors	Unit employs a terminal.	P
1.7.7.3	Terminals for d.c. mains supply conductors	The equipment is not supplied from d.c mains.	N
1.7.8	Controls and indicators		P
1.7.8.1	Identification, location and marking .... :		P
1.7.8.2	Colours .... :	Colors are acceptable due to only used for information (no safety involved even if disregarded).	P
1.7.8.3	Symbols according to IEC 60417 ....:	No standby power switch.	N
1.7.8.4	Markings using figures ....:	Not used.	N
1.7.9	Isolation of multiple power sources ....:	Only connected to AC mains	N
1.7.10	Thermostats and other regulating devices ....:	No thermostats or other regulating devices.	N
1.7.11	Durability	The marking withstands required tests. (see appended table 1.7.11)	P
1.7.12	Removable parts	No removable parts.	N
1.7.13	Replaceable batteries ....:	Additional warning statement of explosion if replaced with different batteries during servicing is marked on the rear panel.	P
	Language(s) ....:	English	--
1.7.14	Equipment for restricted access locations............:	Operator is not instructed to use a tool in order to gain access to operator access area.	N

2	PROTECTION FROM HAZARDS		P
2.1	Protection from electric shock and energy hazards		P
2.1.1	Protection in operator access areas	Operator only has access to SELV circuits and enclosure outer surface.	P
2.1.1.1	Access to energized parts	No hazardous live part is accessible.	P
	Test by inspection .... :	Operator can not contact with any parts with hazardous voltage.	P

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Test with test finger (Figure 2A) .... :	Test finger applied to openings of ventilation side. No hazardous voltage parts accessible	P
	Test with test pin (Figure 2B) .... :	The test pin can not touch hazardous voltage.	P
	Test with test probe (Figure 2C) .... :		N
2.1.1.2	Battery compartments	No battery compartment.	N
2.1.1.3	Access to ELV wiring	No ELV wiring in operator accessible area.	N
	Working voltage (Vpeak or Vrms); minimum distance through insulation (mm)		--
2.1.1.4	Access to hazardous voltage circuit wiring	No hazardous voltage wiring in operator accessible area.	N
2.1.1.5	Energy hazards .... :	Test finger applied to DC terminal. No bridge parts accessible.	P
2.1.1.6	Manual controls	Standby push button is of insulating material.	P
2.1.1.7	Discharge of capacitors in equipment	No risk of electric shock.	P
	Measured voltage (V); time-constant (s) .... :	(see appended table 2.1.1.7)	--
2.1.1.8	Energy hazards – d.c. mains supply	Not connected to DC mains supply.	N
	a) Capacitor connected to the d.c. mains supply . :		N
	b) Internal battery connected to the d.c. mains supply .... :		N
2.1.1.9	Audio amplifiers .... :	No audio amplifier.	N
2.1.2	Protection in service access areas	No service access area.	N
2.1.3	Protection in restricted access locations	The unit is not limited to be used in restricted access locations	N

2.2	SELV circuits		P
2.2.1	General requirements	The secondary circuits were tested as SELV.	P
2.2.2	Voltages under normal conditions (V) .... :	Not exceed 42.4V peak or 60V dc in SELV circuit under normal operation.	P
2.2.3	Voltages under fault conditions (V) .... :	Single fault cause did not excessive voltage in accessible SELV circuits. (see appended table 2.2.2 and 5.3)	P

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.2.4	Connection of SELV circuits to other circuits ......:	SELV circuits are only connected to other SELV circuits.	P

2.3	TNV circuits		N
2.3.1	Limits		N
	Type of TNV circuits .... :		--
2.3.2	Separation from other circuits and from accessible parts		N
2.3.2.1	General requirements		N
2.3.2.2	Protection by basic insulation		N
2.3.2.3	Protection by earthing		N
2.3.2.4	Protection by other constructions .... :		N
2.3.3	Separation from hazardous voltages		N
	Insulation employed... :		--
2.3.4	Connection of TNV circuits to other circuits		N
	Insulation employed... :		--
2.3.5	Test for operating voltages generated externally		N

2.4	Limited current circuits		P
2.4.1	General requirements	Backfeed protection provided by safety relay which is mounted on the main PCB. The backfeed protection circuit works reliably in normal and single-fault condition.	P
2.4.2	Limit values		P
	Frequency (Hz)... :	(see appended table 2.4.2)	P
	Measured current (mA).. :	(see appended table 2.4.2)	P
	Measured voltage (V) .... :	(see appended table 2.4.2)	P
	Measured circuit capacitance (nF or µF)............... :		--
2.4.3	Connection of limited current circuits to other circuits	Only intended to be connected with SELV circuits	N

2.5	Limited power sources	(Not applied for)	N
	a) Inherently limited output		N
	b) Impedance limited output		N

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
	c) Regulating network limited output under normal operating and single fault condition		N
	d) Overcurrent protective device limited output		N
	Max. output voltage (V), max. output current (A), max. apparent power (VA)...................................... :		N
	Current rating of overcurrent protective device (A)		N

2.6	Provisions for earthing and bonding		P
2.6.1	Protective earthing	Reliable connection of relevant conductive parts to the PE terminal by appliance inlet.	P
2.6.2	Functional earthing	Compliance checked.	P
2.6.3	Protective earthing and protective bonding conductors	Protective earthing and protective bonding conductors have sufficient current-carrying capacity.	P
2.6.3.1	General		P
2.6.3.2	Size of protective earthing conductors		P
	Rated current (A), cross-sectional area (mm^2), AWG .... :		--
2.6.3.3	Size of protective bonding conductors		P
	Rated current (A), cross-sectional area (mm^2), AWG .... :	According to table 3B. 10AWG minimum.	P
2.6.3.4	Resistance of earthing conductors and their terminations; resistance (Ω), voltage drop (V), test current (A), duration (min) .... :	≤0.1Ω, see appended table 2.6.3.3	P
2.6.3.5	Colour of insulation... :	Green-yellow.	P
2.6.4	Terminals		N
2.6.4.1	General		N
2.6.4.2	Protective earthing and bonding terminals		N
	Rated current (A), type, nominal thread diameter (mm)... :		--
2.6.4.3	Separation of the protective earthing conductor from protective bonding conductors		N
2.6.5	Integrity of protective earthing		N
2.6.5.1	Interconnection of equipment	No interconnection of equipment.	N

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Clause	Requirement + Test	Result - Remark	Verdict
2.6.5.2	Components in protective earthing conductors and protective bonding conductors	There are no switches or overcurrent protective devices in the protective earthing / bonding conductors.	P
2.6.5.3	Disconnection of protective earth	It is not possible to disconnect protective earth without disconnecting mains; an appliance coupler is used as disconnect device.	P
2.6.5.4	Parts that can be removed by an operator	No operator removable parts with protective earth connection except supply cord.	P
2.6.5.5	Parts removed during servicing	Protective earthed parts cannot be removed in a way which impairs safety.	P
2.6.5.6	Corrosion resistance	No risk of corrosion.	P
2.6.5.7	Screws for protective bonding		P
2.6.5.8	Reliance on telecommunication network or cable distribution system	Protective earthing does not rely on a telecommunication network.	N
2.7	Overcurrent and earth fault protection in primary circuits		P
2.7.1	Basic requirements	Protective device is integrated in the equipment, see also Sub-clause 5.3.	P
	Instructions when protection relies on building installation	Protective device is integrated in the equipment, see also Sub-clause 5.3.	P
2.7.2	Faults not simulated in 5.3.7		N
2.7.3	Short-circuit backup protection	Adequate protective device.	P
2.7.4	Number and location of protective devices .... :	In Norway, IT power distribution system is used. Equipment with a single protective device is accepted in Norway. Other countries (e.g. Germany and Belgium) may have additional requirements.	P
2.7.5	Protection by several devices	Only one protective device. See Sub-clause 2.7.4.	P

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Clause	Requirement + Test	Result - Remark	Verdict
2.7.6	Warning to service personnel ....:	After operation of the protective device, the equipment is still under voltage if it is connected to an IT-power distribution system. A warning is required for service persons. Norway does not require this warning. See also Sub-clause 2.7.4.	N
2.8	Safety interlocks		N
2.8.1	General principles	No safety interlocks.	N
2.8.2	Protection requirements		N
2.8.3	Inadvertent reactivation		N
2.8.4	Fail-safe operation		N
2.8.5	Moving parts		N
2.8.6	Overriding		N
2.8.7	Switches and relays		N
2.8.7.1	Contact gaps (mm) ....:		N
2.8.7.2	Overload test		N
2.8.7.3	Endurance test		N
2.8.7.4	Electric strength test		N
2.8.8	Mechanical actuators		N
2.9	Electrical insulation		P
2.9.1	Properties of insulating materials	Suitable material according to their thermal electrical and mechanical properties.	P
2.9.2	Humidity conditioning	Humidity treatment performed for 120 hrs.	P
	Relative humidity (%), temperature (°C) ....:	90-95%, 40°C.	P
2.9.3	Grade of insulation	The adequate levels of safety insulation is provided and maintained to comply with the requirements of this standard	P
2.9.4	Separation from hazardous voltages	See below.	P
	Method(s) used ....:	Method 1 and 2	--
2.10	Clearances, creepage distances and distances through insulation		P
2.10.1	General		P
2.10.1.1	Frequency ....:	Considered.	P

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.1.2	Pollution degrees .... :	Pollution Degree 2.	P
2.10.1.3	Reduced values for functional insualtion	The functional insulation complied with clause 5.3.4.	P
2.10.1.4	Intervening unconnected conductive parts	Considered.	P
2.10.1.5	Insulation with varying dimensions	No such transformer used.	N
2.10.1.6	Special separation requirements	Special separation is not used.	N
2.10.1.7	Insulation in circuits generating starting pulses	No insulation in circuit generating starting pulses.	N
2.10.2	Determination of working voltage	(See appended table 2.10.2)	P
2.10.2.1	General		P
2.10.2.2	RMS working voltage	(See appended table 2.10.2)	P
2.10.2.3	Peak working voltage	(See appended table 2.10.2)	P
2.10.3	Clearances	(see appended table 2.10.3 and 2.10.4)	P
2.10.3.1	General		P
2.10.3.2	Mains transient voltages	Normal transient voltage considered	N
	a) AC mains supply .... :		N
	b) Earthed d.c. mains supplies .... :		N
	c) Unearthed d.c. mains supplies .... :		N
	d) Battery operation .... :		N
2.10.3.3	Clearances in primary circuits	(see appended table 2.10.3 and 2.10.4)	P
2.10.3.4	Clearances in secondary circuits	Only the functional insulation in secondary circuits complied with clause 5.3.4.	N
2.10.3.5	Clearances in circuits having starting pulses	The circuit will not generating starting pulse.	N
2.10.3.6	Transients from a.c. mains supply .... :	Considered.	P
2.10.3.7	Transients from d.c. mains supply .... :	Not connected to d.c mains supply.	N
2.10.3.8	Transients from telecommunication networks and cable distribution systems .... :	Not connected to telecommunication networks and cable distribution systems.	N
2.10.3.9	Measurement of transient voltage levels	Normal transient voltage considered	N
	a) Transients from a mains suplply		N
	For an a.c. mains supply .... :		N
	For a d.c. mains supply .... :		N

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Transients from a telecommunication network :		N
2.10.4	Creepage distances		P
2.10.4.1	General	Considered	P
2.10.4.2	Material group and caomparative tracking index		P
	CTI tests .... :	Material group IIIb is assumed to be used	P
2.10.4.3	Minimum creepage distances	(see appended table 2.10.3 and 2.10.4)	P
2.10.5	Solid insulation	Solid or laminated insulating materials having adequate thickness are provided.	P
2.10.5.1	General	Considered.	P
2.10.5.2	Distances through insulation	(see appended table 2.10.5)	P
2.10.5.3	Insulating compound as solid insulation	No such construction used.	N
2.10.5.4	Semiconductor devices	No such component used.	N
2.10.5.5.	Cemented joints	Not used.	N
2.10.5.6	Thin sheet material – General	Thin sheet material in form of polyester tape used in transformer	P
2.10.5.7	Separable thin sheet material		P
	Number of layers (pcs) .... :	3 layers	P
2.10.5.8	Non-separable thin sheet material	Not used.	N
2.10.5.9	Thin sheet material – standard test procedure	Not used.	N
	Electric strength test		--
2.10.5.10	Thin sheet material – alternative test procedure	(see appended table 2.10.5)	P
	Electric strength test	(see appended table 2.10.5)	P
2.10.5.11	Insulation in wound components	Not used.	N
2.10.5.12	Wire in wound components		N
	Working voltage .... :		N
	a) Basic insulation not under stress .... :		N
	b) Basic, supplemetary, reinforced insulation .... :		N
	c) Compliance with Annex U .... :		N
	Two wires in contact inside wound component; angle between 45° and 90° .... :		N
2.10.5.13	Wire with solvent-based enamel in wound components	No wire with solvent-based enamel in wound components.	N
	Electric strength test		N
	Routine test		N

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.5.14	Additional insulation in wound components	No additional insulation used.	N
	Working voltage .... :		N
	- Basic insulation not under stress .... :		N
	- Supplemetary, reinforced insulation .... :		N
2.10.6	Construction of printed boards	See below.	P
2.10.6.1	Uncoated printed boards	(see appended table 2.10.3 and 2.10.4)	P
2.10.6.2	Coated printed boards		N
2.10.6.3	Insulation between conductors on the same inner surface of a printed board		N
2.10.6.4	Insulation between conductors on different layers of a printed board		N
	Distance through insulation		N
	Number of insulation layers (pcs).......................... :		N
2.10.7	Component external terminations	Coatings not used over terminations to increase effective creepage and clearance distances.	N
2.10.8	Tests on coated printed boards and coated components	No special coating in order to reduce distance.	N
2.10.8.1	Sample preparation and preliminary inspection		N
2.10.8.2	Thermal conditioning		N
2.10.8.3	Electric strength test		N
2.10.8.4	Abrasion resistance test		N
2.10.9	Thermal cycling	No special insulation in order to reduce distance.	N
2.10.10	Test for Pollution Degree 1 environment and insulating compound	For relay, see appended table 1.5.1.	P
2.10.11	Tests for semiconductor devices and cemented joints	No such device used.	N
2.10.12	Enclosed and sealed parts	For relay, see appended table 1.5.1.	P

3	WIRING, CONNECTIONS AND SUPPLY		P
3.1	General		P
3.1.1	Current rating and overcurrent protection	Adequate cross sectional areas on internal wiring.	P

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Clause	Requirement + Test	Result - Remark	Verdict
3.1.2	Protection against mechanical damage	Wireways are smooth and free from edges. Wires are adequately fixed to prevent excessive strain on wire and terminals and avoiding damage to the insulation of the conductors.	P
3.1.3	Securing of internal wiring	Internal wiring is secured against excessive strain, loosening of terminals and damage to the conductor insulation.	P
3.1.4	Insulation of conductors	Insulation on internal conductors is considered to be of adequate quality and suitable for the application and the working voltage involved.	P
3.1.5	Beads and ceramic insulators	No beads or similar ceramic insulators on conductors.	N
3.1.6	Screws for electrical contact pressure	No screw for electrical contact.	N
3.1.7	Insulating materials in electrical connections	No contact pressure through insulating material.	P
3.1.8	Self-tapping and spaced thread screws	Thread-cutting or space thread screws are not used for electrical connections.	P
3.1.9	Termination of conductors	Terminations cannot become displaced so that clearances and creepage distances can be reduced.	P
	10 N pull test	Conducted.	P
3.1.10	Sleeving on wiring	Sleeves are used as supplementary insulation.	P
3.2	Connection to a mains supply		P
3.2.1	Means of connection	The unit is provided with a terminal for permanent connection to the supply.	P
3.2.1.1	Connection to an a.c. mains supply	For connection to the supply by terminal.	P
3.2.1.2	Connection to a d.c. mains supply	The equipment is not for connection to a d.c. mains supply.	N
3.2.2	Multiple supply connections	Only one supply connection.	N

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Clause	Requirement + Test	Result - Remark	Verdict
3.2.3	Permanently connected equipment	The equipment is not intended for permanent connection to the mains.	N
	Number of conductors, diameter of cable and conduits (mm) .... :		--
3.2.4	Appliance inlets	Not provided	N
3.2.5	Power supply cords		N
3.2.5.1	AC power supply cords		N
	Type .... :		N
	Rated current (A), cross-sectional area (mm^2), AWG .... :		N
3.2.5.2	DC power supply cords	Not provided.	N
3.2.6	Cord anchorages and strain relief		N
	Mass of equipment (kg), pull (N) .... :		--
	Longitudinal displacement (mm) .... :		--
3.2.7	Protection against mechanical damage	No sharp points or cutting edges on the equipment surfaces.	N
3.2.8	Cord guards	The equipment is neither hand-held nor intended to be moved during operation.	N
	Diameter or minor dimension D (mm); test mass (g) .... :		--
	Radius of curvature of cord (mm).......................... :		--
3.2.9	Supply wiring space		N

3.3	Wiring terminals for connection of external conductors		P
3.3.1	Wiring terminals		N
3.3.2	Connection of non-detachable power supply cords		N
3.3.3	Screw terminals		P
3.3.4	Conductor sizes to be connected		P
	Rated current (A), cord/cable type, cross-sectional area (mm^2).. :		--
3.3.5	Wiring terminal sizes		N
	Rated current (A), type, nominal thread diameter (mm) .... :		--
3.3.6	Wiring terminal design		N
3.3.7	Grouping of wiring terminals		N
3.3.8	Stranded wire		N

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Clause	Requirement + Test	Result - Remark	Verdict

3.4	Disconnection from the mains supply		P
3.4.1	General requirement	See Sub-clause 3.4.2.	P
3.4.2	Disconnect devices	Permanently connected equipment.	P
3.4.3	Permanently connected equipment	External disconnect devices would be supplied with the equipment.	P
3.4.4	Parts which remain energized	When supply is disconnected, there are no parts remaining with hazardous voltage or energy in the equipment.	P
3.4.5	Switches in flexible cords	No switch.	N
3.4.6	Number of poles - single-phase and d.c. equipment	The disconnect device disconnects both poles simultaneously.	P
3.4.7	Number of poles - three-phase equipment	Single phase equipment.	N
3.4.8	Switches as disconnect devices	No switches provided.	N
3.4.9	Plugs as disconnect devices	The appliance coupler is regarded as disconnect device, no warning is required.	N
3.4.10	Interconnected equipment	No interconnections using hazardous voltages.	N
3.4.11	Multiple power sources	One power source only.	N

3.5	Interconnection of equipment		P
3.5.1	General requirements	SELV voltage connections for the output. Not compatible with connection for the input.	P
3.5.2	Types of interconnection circuits ....:	See 3.5.1	P
3.5.3	ELV circuits as interconnection circuits	No ELV interconnection.	N
3.5.4	Data ports for additional equipment	No data ports.	N

4	PHYSICAL REQUIREMENTS		P
4.1	Stability		P
	Angle of 10°	The unit do not overbalance when tilted to an angle of 10 degree.	P
	Test force (N) .... :		P

4.2	Mechanical strength		P

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Clause	Requirement + Test	Result - Remark	Verdict
4.2.1	General	Tests performed and passed. Results see below. After the tests, unit complied with the requirements of sub-clauses 2.1.1, 2.6.1, 2.10 and 4.4.1.	P
4.2.2	Steady force test, 10 N	10 N applied to components.	P
4.2.3	Steady force test, 30 N	30 N applied to parts inside the UPS.	P
4.2.4	Steady force test, 250 N	250 N applied to outer enclosure. No energy or other hazards.	P
4.2.5	Impact test	No hazard as a result from steel ball impact test.	P
	Fall test	No hazard as a result from steel ball impact test.	P
	Swing test	No hazard as result from steel sphere ball swung test.	P
4.2.6	Drop test; height (mm) .... :	Not required for this equipment.	N
4.2.7	Stress relief test	Not required for this equipment.	N
4.2.8	Cathode ray tubes	No cathode ray tube.	N
	Picture tube separately certified .... :		--
4.2.9	High pressure lamps	No high pressure lamp provided.	N
4.2.10	Wall or ceiling mounted equipment; force (N) ...... :	Not for wall or ceiling mounting.	N

4.3	Design and construction		
4.3.1	Edges and corners	Edges and corners of the enclosure are rounded.	P
4.3.2	Handles and manual controls; force (N).............:	No axial pull applied to pushbutton of stand-by switch because it is unlikely to be pulled.	N
4.3.3	Adjustable controls	No adjustable controls.	N
4.3.4	Securing of parts	Mechanical fixings in such a way designed that they will withstand mechanical stress occurring in normal use.	P
4.3.5	Connection by plugs and sockets	No mismatch of connectors.	P
4.3.6	Direct plug-in equipment	Not direct plug-in type.	N

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Clause	Requirement + Test	Result - Remark	Verdict
	Torque .... :		--
	Compliance with the relevant mains plug standard .... :		--
4.3.7	Heating elements in earthed equipment	No heating elements provided.	N
4.3.8	Batteries	No batteries	N
	- Overcharging of a rechargeable battery		N
	- Unintentional charging of a non-rechargeable battery		N
	- Reverse charging of a rechargeable battery		N
	- Excessive discharging rate for any battery		N
4.3.9	Oil and grease	Insulation is not exposed to oil, grease etc.	N
4.3.10	Dust, powders, liquids and gases	The equipment does not generate ionizing radiation or use a laser, and does not contain flammable liquids or gases.	N
4.3.11	Containers for liquids or gases	No containers for liquids or gases in the equipment.	N
4.3.12	Flammable liquids .... :	The equipment does not contain flammable liquid.	N
	Quantity of liquid (l) .... :		--
	Flash point (°C) .... :		--
4.3.13	Radiation		P
4.3.13.1	General		P
4.3.13.2	Ionizing radiation	No ionising radiation.	N
	Measured radiation (pA/kg) .... :		N
	Measured high-voltage (kV) .... :		N
	Measured focus voltage (kV) .... :		N
	CRT markings .... :		N
4.3.13.3	Effect of ultraviolet (UV) radiation on materials	No ultraviolet radiation.	N
	Part, property, retention after test, flammability classification .... :		N
4.3.13.4	Human exposure to ultraviolet (UV) radiation ..... :		N
4.3.13.5	Laser (including LEDs)	Non-lasing LEDs provided for indicating only.	P
	Laser class .... :	Class 1	--

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Clause	Requirement + Test	Result - Remark	Verdict
4.3.13.6	Other types .... :	The equipment does not generate other types of radiation.	N
4.4	Protection against hazardous moving parts		P
4.4.1	General	DC fan located at secondary circuit. The enclosure of the unit provide as fan guard. Test finger applied to openings. No fan blade accessible.	P
4.4.2	Protection in operator access areas .... :	See above.	P
4.4.3	Protection in restricted access locations .... :	Not for restricted access locations.	N
4.4.4	Protection in service access areas	See 4.4.1	P
4.5	Thermal requirements		P
4.5.1	General		P
4.5.2	Temperature tests	(see appended table 4.5)	P
	Normal load condition per Annex L .... :		P
4.5.3	Temperature limits for materials	(see appended table 4.5)	P
4.5.4	Touch temperature limits	(see appended table 4.5)	P
4.5.5	Resistance to abnormal heat .... :	(see appended table 4.5.5)	P
4.6	Openings in enclosures		P
4.6.1	Top and side openings	See appended table 4.6.1 and 4.6.2	P
	Dimensions (mm) .... :		P
4.6.2	Bottoms of fire enclosures	See appended table 4.6.1 and 4.6.2	P
	Construction of the bottomm, dimensions (mm) .. :		--
4.6.3	Doors or covers in fire enclosures	No doors or covers in fire enclosure.	N
4.6.4	Openings in transportable equipment	Not transportable equipment.	N
4.6.4.1	Constructional design measures		N
	Dimensions (mm) .... :		--
4.6.4.2	Evaluation measures for larger openings		N
4.6.4.3	Use of metallized parts		N
4.6.5	Adhesives for constructional purposes	No adhesives used for constructional purposes.	N

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Clause	Requirement + Test	Result - Remark	Verdict
	Conditioning temperature (°C), time (weeks) .... :		--
4.7	Resistance to fire		P
4.7.1	Reducing the risk of ignition and spread of flame	Method 1 is used.	P
	Method 1, selection and application of components wiring and materials	Method 1 used. No excessive temperatures. No easily burning materials employed. Safety relevant components used within their specified temperature limits. (see appended table 4.7)	P
	Method 2, application of all of simulated fault condition tests	Not used method 2.	N
4.7.2	Conditions for a fire enclosure	For all parts inside enclosure, a fire enclosure is required.	P
4.7.2.1	Parts requiring a fire enclosure		P
4.7.2.2	Parts not requiring a fire enclosure		N
4.7.3	Materials		P
4.7.3.1	General	Components and materials have adequate flammability classification. For details see table 1.5.1	P
4.7.3.2	Materials for fire enclosures	Metal material.	P
4.7.3.3	Materials for components and other parts outside fire enclosures	No parts outside the fire enclosure.	P
4.7.3.4	Materials for components and other parts inside fire enclosures	Other materials inside fire enclosure are minimum V-2 material.	P
4.7.3.5	Materials for air filter assemblies	No air filters in the equipment.	N
4.7.3.6	Materials used in high-voltage components	No parts exceeding 4kV.	N
5	ELECTRICAL REQUIREMENTS AND SIMULATED ABNORMAL CONDITIONS		P
5.1	Touch current and protective conductor current		P
5.1.1	General	Test conducted in accordance with 5.1.2 to 5.1.7.	P
5.1.2	Configuration of equipment under test (EUT)	EUT has only one mains connection.	P
5.1.2.1	Single connection to an a.c. mains supply	No interconnection of equipment.	P
5.1.2.2	Redundant multiple connections to an a.c. mains supply	No multiple power sources.	N

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Clause	Requirement + Test	Result - Remark	Verdict
5.1.2.3	Simultaneous multiple connections to an a.c. mains supply	No multiple power sources.	N
5.1.3	Test circuit	Using figure 5A.	P
5.1.4	Application of measuring instrument	Measuring instrument D1 is used.	P
5.1.5	Test procedure	The touch current was measured from primary to enclosure and primary to output.	P
5.1.6	Test measurements		P
	Supply voltage (V) ....:	(See appended table 5.1)	--
	Measured touch current (mA) ....:	(See appended table 5.1)	--
	Max. allowed touch current (mA) ....:	(See appended table 5.1)	--
	Measured protective conductor current (mA) ....:		--
	Max. allowed protective conductor current (mA)...:		--
5.1.7	Equipment with touch current exceeding 3,5 mA	The touch current does not exceed 3.5mA.	N
5.1.7.1	General ....:		N
5.1.7.2	Simultaneous multiple connections to the supply		N
5.1.8	Touch currents to telecommunication networks and cable distribution systems and from telecommunication networks		N
5.1.8.1	Limitation of the touch current to a telecommunication network or to a cable distribution system	No test necessary.	N
	Supply voltage (V) ....:		--
	Measured touch current (mA) ....:		--
	Max. allowed touch current (mA) ....:		--
5.1.8.2	Summation of touch currents from telecommunication networks		N
	a) EUT with earthed telecommunication ports .....:		N
	b) EUT whose telecommunication ports have no reference to protective earth		N
5.2	Electric strength		P
5.2.1	General	(see appended table 5.2)	P
5.2.2	Test procedure	(see appended table 5.2)	P
5.3	Abnormal operating and fault conditions		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.3.1	Protection against overload and abnormal operation	(see appended table 5.3)	P
5.3.2	Motors	TÜV approved DC fan used in secondary circuit.	P
5.3.3	Transformers	(see appended Annex C)	P
5.3.4	Functional insulation...:	Short-circuited, results see appended table 5.3.	P
5.3.5	Electromechanical components	No electromechanical components.	N
5.3.6	Audio amplifiers in ITE ....:	No audio amplifier in equipment.	N
5.3.7	Simulation of faults	Results see appended table 5.3.	P
5.3.8	Unattended equipment	No thermostats, temperature limiters or thermal cut-outs.	P
5.3.9	Compliance criteria for abnormal operating and fault conditions	See below.	P
5.3.9.1	During the tests	No fire or molten metal occurred and no deformation of enclosure during the tests.	P
5.3.9.2	After the tests	No reduction of clearance and creepage distances. Electric strength test is made on Funcational, Basic and reinforced insulation.	P

6	CONNECTION TO TELECOMMUNICATION NETWORKS		N
6.1	Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment		N
6.1.1	Protection from hazardous voltages		N
6.1.2	Separation of the telecommunication network from earth		N
6.1.2.1	Requirements		N
	Supply voltage (V) .... :	1.	N
	Current in the test circuit (mA) .... :		--
6.1.2.2	Exclusions .... :		N

6.2	Protection of equipment users from overvoltages on telecommunication networks		N
6.2.1	Separation requirements		N
6.2.2	Electric strength test procedure		N
6.2.2.1	Impulse test		N
6.2.2.2	Steady-state test		N

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Clause	Requirement + Test	Result - Remark	Verdict
6.2.2.3	Compliance criteria		N
6.3	Protection of the telecommunication wiring system from overheating *(The circuit is not intended to supply other units via telecommunication wiring system.)*		N
	Max. output current (A) .... :		N
	Current limiting method .... :		N
7	CONNECTION TO CABLE DISTRIBUTION SYSTEMS		N
7.1	General	Not connected to Cable Distribution System.	N
7.2	Protection of cable distribution system service persons, and users of other equipment connected to the system, from hazardous voltages in the equipment		N
7.3	Protection of equipment users from overvoltages on the cable distribution system		N
7.4	Insulation between primary circuits and cable distribution systems		N
7.4.1	General		N
7.4.2	Voltage surge test		N
7.4.3	Impulse test		N
A	ANNEX A, TESTS FOR RESISTANCE TO HEAT AND FIRE		N
A.1	Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment (see 4.7.3.2)		N
A.1.1	Samples.. :		N
	Wall thickness (mm) .... :		--
A.1.2	Conditioning of samples; temperature (°C) .... :		N
A.1.3	Mounting of samples .... :		N
A.1.4	Test flame (see IEC 60695-11-3)		N
	Flame A, B, C or D .... :		--
A.1.5	Test procedure		N
A.1.6	Compliance criteria		N
	Sample 1 burning time (s) .... :		--
	Sample 2 burning time (s) .... :		--
	Sample 3 burning time (s) .... :		--

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Clause	Requirement + Test	Result - Remark	Verdict
A.2	Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2 and 4.7.3.4)		N
A.2.1	Samples, material .... :		N
	Wall thickness (mm) .... :		--
A.2.2	Conditioning of samples; temperature (°C) .... :		N
A.2.3	Mounting of samples .... :		N
A.2.4	Test flame (see IEC 60695-11-4)		N
	Flame A, B or C .... :		--
A.2.5	Test procedure		N
A.2.6	Compliance criteria		N
	Sample 1 burning time (s) .... :		--
	Sample 2 burning time (s) .... :		--
	Sample 3 burning time (s) .... :		--
A.2.7	Alternative test acc. to IEC 60695-11-5, cl. 5 and 9		N
	Sample 1 burning time (s) .... :		--
	Sample 2 burning time (s) .... :		--
	Sample 3 burning time (s) .... :		--
A.3	Hot flaming oil test (see 4.6.2)		--
A.3.1	Mounting of samples		N
A.3.2	Test procedure		N
A.3.3	Compliance criterion		N

B	ANNEX B, MOTOR TESTS UNDER ABNORMAL CONDITIONS (see 4.7.2.2 and 5.3.2)		N
B.1	General requirements		N
	Position .... :		--
	Manufacturer .... :		--
	Type .... :		--
	Rated values .... :		--
B.2	Test conditions		N
B.3	Maximum temperatures		N
B.4	Running overload test		N
B.5	Locked-rotor overload test		N
	Test duration (days) .... :		--
	Electric strength test: test voltage (V) .... :		--

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Clause	Requirement + Test	Result - Remark	Verdict
B.6	Running overload test for d.c. motors in secondary circuits		N
B.6.1	General		N
B.6.2	Test procedure		N
B.6.3	Alternative test procedure		N
B.6.4	Electric strength test; test voltage (V) .... :		N
B.7	Locked-rotor overload test for d.c. motors in secondary circuits		N
B.7.1	General		N
B.7.2	Test procedure		N
B.7.3	Alternative test procedure		N
B.7.4	Electric strength test; test voltage (V) ....:		N
B.8	Test for motors with capacitors		N
B.9	Test for three-phase motors		N
B.10	Test for series motors		N
	Operating voltage (V) .... :		N
C	ANNEX C, TRANSFORMERS (see 1.5.4 and 5.3.3)		P
	Position .... :	Main transformer, current transformer CT1	--
	Manufacturer .... :	(see appended table 1.5.1)	--
	Type .... :	(see appended table 1.5.1)	--
	Rated values .... :	(see appended table 1.5.1)	--
	Method of protection.. :	Protection by electronic circuits and software controls.	--
C.1	Overload test	(see appended table 5.3)	P
C.2	Insulation	(see appended table 5.2)	P
	Protection from displacement of windings :		P
D	ANNEX D, MEASURING INSTRUMENTS FOR TOUCH-CURRENT TESTS (see 5.1.4)		P
D.1	Measuring instrument	As in figure D1 used.	P
D.2	Alternative measuring instrument	Not used.	N
E	ANNEX E, TEMPERATURE RISE OF A WINDING (see 1.4.13) *Thermocouple method used*		P
F	ANNEX F, MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES (see 2.10 and Annex G)		P

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Clause	Requirement + Test	Result - Remark	Verdict

G	ANNEX G, ALTERNATIVE METHOD FOR DETERMINING MINIMUM CLEARANCES		N
G.1	Clearances		N
G.1.1	General		N
G.1.2	Summary of the procedure for determining minimum clearances		N
G.2	Determination of mains transient voltage (V)		N
G.2.1	AC mains supply .... :		N
G.2.2	Earthed d.c. mains supplies .... :		N
G.2.3	Unearthed d.c. mains supplies .... :		N
G.2.4	Battery operation .... :		N
G.3	Determination of telecommunication network transient voltage (V) .... :		N
G.4	Determination of required withstand voltage (V)		N
G.4.1	Mains transients and internal repetitive peaks .... :		N
G.4.2	Transients from telecommunication networks ..... :		N
G.4.3	Combination of transients		N
G.4.4	Transients from cable distribution systems		N
G.5	Measurement of transient voltages (V)		N
	a) Transients from a mains supply		--
	For an a.c. mains supply		--
	For a d.c. mains supply		--
	b) Transients from a telecommunication network		--
G.6	Determination of minimum clearances .... :		N

H	ANNEX H, IONIZING RADIATION (see 4.3.13)		N

J	ANNEX J, TABLE OF ELECTROCHEMICAL POTENTIALS (see 2.6.5.6)		N
	Metal(s) used :		--

K	ANNEX K, THERMAL CONTROLS (see 1.5.3 and 5.3.8)		N
K.1	Making and breaking capacity		N
K.2	Thermostat reliability; operating voltage (V) .... :		N
K.3	Thermostat endurance test; operating voltage (V) .... :		N
K.4	Temperature limiter endurance; operating voltage (V) .... :		N

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Clause	Requirement + Test	Result - Remark	Verdict
K.5	Thermal cut-out reliability		N
K.6	Stability of operation		N
L	ANNEX L, NORMAL LOAD CONDITIONS FOR SOME TYPES OF ELECTRICAL BUSINESS EQUIPMENT (see 1.2.2.1 and 4.5.2)		N
L.1	Typewriters		N
L.2	Adding machines and cash registers		N
L.3	Erasers		N
L.4	Pencil sharpeners		N
L.5	Duplicators and copy machines		N
L.6	Motor-operated files		N
L.7	Other business equipment		N
M	ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1)		N
M.1	Introduction		N
M.2	Method A		N
M.3	Method B		N
M.3.1	Ringing signal		N
M.3.1.1	Frequency (Hz) .... :		N
M.3.1.2	Voltage (V) .... :		N
M.3.1.3	Cadence; time (s), voltage (V) .... :		N
M.3.1.4	Single fault current (mA) .... :		N
M.3.2	Tripping device and monitoring voltage .... :		N
M.3.2.1	Conditions for use of a tripping device or a monitoring voltage		N
M.3.2.2	Tripping device		N
M.3.2.3	Monitoring voltage (V) .... :		N
N	ANNEX N, IMPULSE TEST GENERATORS (see 1.5.7.2, 1.5.7.3, 2.10.3.9, 6.2.2.1, 7.3.2, 7.4.3 and Clause G.5)		N
N.1	ITU-T impulse test generators		N
N.2	IEC 60065 impulse test generator		N
Q	ANNEX Q, Voltage dependent resistors (VDRs) (see 1.5.9.1)		N
	a) Preferred climatic categories .... :		N
	b) Maximum continuous voltage .... :		N
	c) Pulse current .... :		N

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Clause	Requirement + Test	Result - Remark	Verdict
R	ANNEX R, EXAMPLES OF REQUIREMENTS FOR QUALITY CONTROL PROGRAMMES		N
R.1	Minimum separation distances for unpopulated coated printed boards (see 2.10.6.2)		N
R.2	Reduced clearances (see 2.10.3)		N
S	ANNEX S, PROCEDURE FOR IMPULSE TESTING (see 6.2.2.3)		N
S.1	Test equipment		N
S.2	Test procedure		N
S.3	Examples of waveforms during impulse testing		N
T	ANNEX T, GUIDANCE ON PROTECTION AGAINST INGRESS OF WATER (see 1.1.2)		N
			--
U	ANNEX U, INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION (see 2.10.5.4)		N
			--
V	ANNEX V, AC POWER DISTRIBUTION SYSTEMS (see 1.6.1)		P
V.1	Introduction		P
V.2	TN power distribution systems		P
W	ANNEX W, SUMMATION OF TOUCH CURRENTS		N
W.1	Touch current from electronic circuits		N
W.1.1	Floating circuits		N
W.1.2	Earthed circuits		N
W.2	Interconnection of several equipments		N
W.2.1	Isolation		N
W.2.2	Common return, isolated from earth		N
W.2.3	Common return, connected to protective earth		N
X	ANNEX X, MAXIMUM HEATING EFFECT IN TRANSFORMER TESTS (see clause C.1)		P
X.1	Determination of maximum input current		P
X.2	Overload test procedure		P
Y	ANNEX Y, ULTRAVIOLET LIGHT CONDITIONING TEST (see 4.3.13.3)		N
Y.1	Test apparatus .... :	No ultraviolet light.	N

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Clause	Requirement + Test	Result - Remark	Verdict
Y.2	Mounting of test samples .... :		N
Y.3	Carbon-arc light-exposure apparatus .... :		N
Y.4	Xenon-arc light exposure apparatus .... :		N

Z	ANNEX Z, OVERVOLTAGE CATEGORIES (see 2.10.3.2 and Clause G.2)	N

AA	ANNEX AA, MANDREL TEST (see 2.10.5.8)	N

BB	ANNEX BB, CHANGES IN THE SECOND EDITION	P
EN 60950-1:2006 – COMMON MODIFICATIONS		
Contents	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZC (informative) A-deviations	--
General	Delete all the “country” notes in the reference document according to the following list: 1.4.8 Note 2 ; 1.5.1 Note 2 & 3 ; 1.5.7.1 Note 1.5.8 Note 2 ; 1.5.9.4 Note ; 1.7.2.1 Note 4, 5 & 6 2.2.3 Note ; 2.2.4 Note ; 2.3.2 Note 2.3.2.1 Note 2 ; 2.3.4 Note 2 ; 2.6.3.3 Note 2 & 3 2.7.1 Note ; 2.10.3.2 Note 2 ; 2.10.5.13 Note 3 3.2.1.1 Note ; 3.2.4 Note 3. ; 2.5.1 Note 2 4.3.6 Note 1 & 2 ; 4.7 Note 4 ; 4.7.2.2 Note 4.7.3.1 Note 2 ; 5.1.7.1 Note 3 & 4 ; 5.3.7 Note 1 6 Note 2 & 5 ; 6.1.2.1 Note 2 ; 6.1.2.2 Note 6.2.2 Note 6. ; 2.2.1 Note 2 ; 6.2.2.2 Note 7.1 Note 3 ; 7.2 Note ; 7.3 Note 1 & 2 G.2.1 Note 2 ; Annex H Note 2	--
1.3.Z1	Add the following subclause: 1.3.Z1 Exposure to excessive sound pressure The apparatus shall be so designed and constructed as to present no danger when used for its intended purpose, either in normal operating conditions or under fault conditions, particularly providing protection against exposure to excessive sound pressures from headphones or earphones. NOTE Z1 A new method of measurement is described in EN 50332-1, Sound system equipment: Headphones and earphones associated with portable audio equipment - Maximum sound pressure level measurement methodology and limit considerations - Part 1: General method for “one package equipment”, and in EN 50332-2, Sound system equipment: Headphones and earphones associated with portable audio equipment - Maximum sound pressure level measurement methodology and limit considerations - Part 2: Guidelines to associate sets with headphones coming from different manufacturers.	N

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Clause	Requirement + Test	Result - Remark	Verdict
1.5.1	Add the following NOTE: NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2002/95/EC		P
1.7.2.1	Add the following NOTE: NOTE Z1 In addition, the instructions shall include, as far as applicable, a warning that excessive sound pressure from earphones and headphones can cause hearing loss		N
2.7.1	Replace the subclause as follows: Basic requirements To protect against excessive current, short-circuits and earth faults in PRIMARY CIRCUITS, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c): a) except as detailed in b) and c), protective devices necessary to comply with the requirements of 5.3 shall be included as parts of the equipment; b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation; c) it is permitted for PLUGGABLE EQUIPMENT TYPE B or PERMANENTLY CONNECTED EQUIPMENT, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions. If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for PLUGGABLE EQUIPMENT TYPE A the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.		P
2.7.2	This subclause has been declared ‘void’.		--
3.2.3	Delete the NOTE in Table 3A, and delete also in this table the conduit sizes in parentheses.		--
3.2.5.1	Replace “60245 IEC 53” by “H05 RR-F”; “60227 IEC 52” by “H03 VV-F or H03 VVH2-F”; “60227 IEC 53” by “H05 VV-F or H05 VVH2-F2”. In Table 3B, replace the first four lines by the following: | Up to and including 6		0,75 [a)]
Over 6 up to and including 10	(0,75) [b)]	1,0
Over 10 up to and including 16	(1,0) [c)]	1,5	 In the conditions applicable to Table 3B delete the words “in some countries” in condition [a)]. In NOTE 1, applicable to Table 3B, delete the second sentence.		N
3.3.4	In Table 3D, delete the fourth line: conductor sizes for 10 to 13 A, and replace with the following: | Over 10 up to and including 16	1,5 to 2,5	1,5 to 4 | Delete the fifth line: conductor sizes for 13 to 16 A.		N

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4.3.13.6	Add the following NOTE: NOTE Z1 Attention is drawn to 1999/519/EC: Council Recommendation on the limitation of exposure of the general public to electromagnetic fields 0 Hz to 300 GHz. Standards taking into account this Recommendation which demonstrate compliance with the applicable EU Directive are indicated in the OJEC.	--
Annex H	Replace the last paragraph of this annex by: At any point 10 cm from the surface of the OPERATOR ACCESS AREA, the dose rate shall not exceed 1 μSv/h (0,1 mR/h) (see NOTE). Account is taken of the background level. Replace the notes as follows: NOTE These values appear in Directive 96/29/Euratom. Delete NOTE 2.	N
Biblio-graphy	Additional EN standards.	--

ZA	NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS	N

ZB	SPECIAL NATIONAL CONDITIONS	N
1.2.4.1	In **Denmark**, certain types of Class I appliances (see 3.2.1.1) may be provided with a plug not establishing earthing conditions when inserted into Danish socket-outlets.	N
1.2.13.14	In **Norway** and **Sweden**, for requirements see 1.7.2.1 and 7.3 of this annex.	N
1.5.7.1	In **Finland, Norway** and **Sweden**, resistors bridging BASIC INSULATION in CLASS I PLUGGABLE EQUIPMENT TYPE A must comply with the requirements in 1.5.7.1. In addition when a single resistor is used, the resistor must withstand the resistor test in 1.5.7.2.	N
1.5.8	In **Norway**, due to the IT power system used (see annex V, Figure V.7), capacitors are required to be rated for the applicable line-to-line voltage (230 V).	N
1.5.9.4	In **Finland**, **Norway** and **Sweden**, the third dashed sentence is applicable only to equipment as defined in 6.1.2.2 of this annex.	P

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1.7.2.1	In **Finland**, **Norway** and **Sweden**, CLASS I PLUGGABLE EQUIPMENT TYPE A intended for connection to other equipment or a network shall, if safety relies on connection to protective earth or if surge suppressors are connected between the network terminals and accessible parts, have a marking stating that the equipment must be connected to an earthed mains socket-outlet. The marking text in the applicable countries shall be as follows: In Finland: "Laite on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan" In Norway: “Apparatet må tilkoples jordet stikkontakt” In Sweden: “Apparaten skall anslutas till jordat uttag” In **Norway** and **Sweden**, the screen of the cable distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation need to be isolated from the screen of a cable distribution system. It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by e.g. a retailer. The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in: “Equipment connected to the protective earthing of the building installation through the mains connection or through other equipment with a connection to protective earthing – and to a cable distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a cable distribution system has therefore to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11).” NOTE In Norway, due to regulation for installations of cable distribution systems, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min. Translation to Norwegian (the Swedish text will also be accepted in Norway): “Utstyr som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av utstyret til kabel-TV nettet installeres en galvanisk isolator mellom utstyret og kabel- TV nettet.” Translation to Swedish: ”Utrustning som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medfőra risk főr brand. Főr att undvika detta skall vid anslutning av utrustningen till kabel-TV nät galvanisk isolator finnas mellan utrustningen och kabel-TV nätet.”		
1.7.5	In **Denmark**, socket-outlets for providing power to other equipment shall be in accordance with the Heavy Current Regulations, Section 107-2-D1, Standard Sheet DK 1-3a, DK 1-5a or DK 1-7a, when used on Class I equipment. For STATIONARY EQUIPMENT the socket-outlet shall be in accordance with Standard Sheet DK 1-1b or DK 1-5a. For CLASS II EQUIPMENT the socket outlet shall be in accordance with Standard Sheet DKA 1-4a.		N
2.2.4	In **Norway**, for requirements see 1.7.2.1, 6.1.2.1 and 6.1.2.2 of this annex.		N
2.3.2	In **Finland**, **Norway** and **Sweden** there are additional requirements for the insulation. See 6.1.2.1 and 6.1.2.2 of this annex.		N

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2.3.4	In **Norway**, for requirements see 1.7.2.1, 6.1.2.1 and 6.1.2.2 of this annex.		N
2.6.3.3	In the **United Kingdom**, the current rating of the circuit shall be taken as 13 A, not 16 A.		N
2.7.1	In the **United Kingdom**, to protect against excessive currents and short-circuits in the PRIMARY CIRCUIT of DIRECT PLUG-IN EQUIPMENT, tests according to 5.3 shall be conducted, using an external protective device rated 30 A or 32 A. If these tests fail, suitable protective devices shall be included as integral parts of the DIRECT PLUG-IN EQUIPMENT, so that the requirements of 5.3 are met.		N
2.10.5.13	In **Finland**, **Norway** and **Sweden**, there are additional requirements for the insulation, see 6.1.2.1 and 6.1.2.2 of this annex.		N
3.2.1.1	In **Switzerland**, supply cords of equipment having a RATED CURRENT not exceeding 10 A shall be provided with a plug complying with SEV 1011 or IEC 60884-1 and one of the following dimension sheets: SEV 6532-2.1991 Plug Type 15 3P+N+PE 250/400 V, 10 A SEV 6533-2.1991 Plug Type 11 L+N 250 V, 10 A SEV 6534-2.1991 Plug Type 12 L+N+PE 250 V, 10 A In general, EN 60309 applies for plugs for currents exceeding 10 A. However, a 16 A plug and socket-outlet system is being introduced in Switzerland, the plugs of which are according to the following dimension sheets, published in February 1998: SEV 5932-2.1998 Plug Type 25 3L+N+PE 230/400 V, 16 A SEV 5933-2.1998 Plug Type 21 L+N 250 V, 16 A SEV 5934-2.1998 Plug Type 23 L+N+PE 250 V, 16 A		N
3.2.1.1	In **Denmark**, supply cords of single-phase equipment having a rated current not exceeding13 A shall be provided with a plug according to the Heavy Current Regulations, Section 107-2-D1. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If poly-phase equipment and single-phase equipment having a RATED CURRENT exceeding 13 A is provided with a supply cord with a plug, this plug shall be in accordance with the Heavy Current Regulations, Section 107-2-D1 or EN 60309-2.		N
3.2.1.1	In **Spain**, supply cords of single-phase equipment having a rated current not exceeding 10 A shall be provided with a plug according to UNE 20315:1994. Supply cords of single-phase equipment having a rated current not exceeding 2,5 A shall be provided with a plug according to UNE-EN 50075:1993. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules, shall be provided with a plug in accordance with standard UNE 20315:1994. If poly-phase equipment is provided with a supply cord with a plug, this plug shall be in accordance with UNE-EN 60309-2.		--

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Clause	Requirement + Test	Result - Remark	Verdict
3.2.1.1	In the **United Kingdom**, apparatus which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord and plug, shall be fitted with a 'standard plug' in accordance with Statutory Instrument 1768:1994 - The Plugs and Sockets etc. (Safety) Regulations 1994, unless exempted by those regulations. NOTE 'Standard plug' is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.		--
3.2.1.1	In **Ireland**, apparatus which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to I.S. 411 by means of that flexible cable or cord and plug, shall be fitted with a 13 A plug in accordance with Statutory Instrument 525:1997 - National Standards Authority of Ireland (section 28) (13 A Plugs and Conversion Adaptors for Domestic Use) Regulations 1997.		N
3.2.4	In **Switzerland**, for requirements see 3.2.1.1 of this annex.		N
3.2.5.1	In the **United Kingdom**, a power supply cord with conductor of 1,25 mm2 is allowed for equipment with a rated current over 10 A and up to and including 13 A.		N
3.3.4	In the **United Kingdom**, the range of conductor sizes of flexible cords to be accepted by terminals for equipment with a RATED CURRENT of over 10 A up to and including 13 A is: • 1,25 mm^2 to 1,5 mm^2 nominal cross-sectional area.		N
4.3.6	In the **United Kingdom**, the torque test is performed using a socket outlet complying with BS 1363 part 1:1995, including Amendment 1:1997 and Amendment 2:2003 and the plug part of DIRECT PLUG-IN EQUIPMENT shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16 and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.		N
4.3.6	In **Ireland**, DIRECT PLUG-IN EQUIPMENT is known as plug similar devices. Such devices shall comply with Statutory Instrument 526:1997 - National Standards Authority of Ireland (Section 28) (Electrical plugs, plug similar devices and sockets for domestic use) Regulations, 1997.		N
5.1.7.1	In **Finland**, **Norway** and **Sweden** TOUCH CURRENT measurement results exceeding 3,5 mA r.m.s. are permitted only for the following equipment: • STATIONARY PLUGGABLE EQUIPMENT TYPE A that ○ is intended to be used in a RESTRICTED ACCESS LOCATION where equipotential bonding has been applied, for example, in a telecommunication centre; and ○ has provision for a permanently connected PROTECTIVE EARTHING CONDUCTOR; and ○ is provided with instructions for the installation of that conductor by a SERVICE PERSON; • STATIONARY PLUGGABLE EQUIPMENT TYPE B; • STATIONARY PERMANENTLY CONNECTED EQUIPMENT.		N

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Clause	Requirement + Test	Result - Remark	Verdict

6.1.2.1	In **Finland**, **Norway** and **Sweden**, add the following text between the first and second paragraph of the compliance clause: If this insulation is solid, including insulation forming part of a component, it shall at least consist of either - two layers of thin sheet material, each of which shall pass the electric strength test below, or - one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below. If this insulation forms part of a semiconductor component (e.g. an optocoupler), there is no distance through insulation requirement for the insulation consisting of an insulating compound completely filling the casing, so that CLEARANCES and CREEPAGE DISTANCES do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition - passes the tests and inspection criteria of 2.10.11 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 2.10.10 shall be performed using 1,5 kV), and - is subject to ROUTINE TESTING for electric strength during manufacturing, using a test voltage of 1,5 kV. It is permitted to bridge this insulation with a capacitor complying with EN 132400:1994, subclass Y2. A capacitor classified Y3 according to EN 132400:1994, may bridge this insulation under the following conditions: - the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 132400, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in EN 60950-1:2006, 6.2.2.1; - the additional testing shall be performed on all the test specimens as described in EN 132400; - the impulse test of 2,5 kV is to be performed before the endurance test in EN 132400, in the sequence of tests as described in EN 132400.	N
6.1.2.2	In **Finland**, **Norway** and **Sweden**, the exclusions are applicable for PERMANENTLY CONNECTED EQUIPMENT, PLUGGABLE EQUIPMENT TYPE B and equipment intended to be used in a RESTRICTED ACCESS LOCATION where equipotential bonding has been applied, e.g. in a telecommunication centre, and which has provision for a permanently connected PROTECTIVE EARTHING CONDUCTOR and is provided with instructions for the installation of that conductor by a SERVICE PERSON.	N
7.2	In **Finland**, **Norway** and **Sweden**, for requirements see 6.1.2.1 and 6.1.2.2 of this annex. The term TELECOMMUNICATION NETWORK in 6.1.2 being replaced by the term CABLE DISTRIBUTION SYSTEM.	N
7.3	In **Norway** and **Sweden**, for requirements see 1.2.13.14 and 1.7.2.1 of this annex.	N
7.3	In **Norway**, for installation conditions see EN 60728-11:2005.	N

ZC	A-DEVIATIONS (informative)	P

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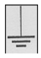
Clause	Requirement + Test	Result - Remark	Verdict
1.5.1	**Sweden** (Ordinance 1990:944) Add the following: NOTE In Sweden, switches containing mercury are not permitted.		P
1.5.1	**Switzerland** (Ordinance on environmentally hazardous substances SR 814.081, Annex 1.7, Mercury - Annex 1.7 of SR 814.81 applies for mercury.) Add the following: NOTE In Switzerland, switches containing mercury such as thermostats, relays and level controllers are not allowed.		P
1.7.2.1	**Denmark** (Heavy Current Regulations) Supply cords of CLASS I EQUIPMENT, which is delivered without a plug, must be provided with a visible tag with the following text: Vigtigt! Lederen med grøn/gul isolation må kun tilsluttes en klemme mærket  eller  If essential for the safety of the equipment, the tag must in addition be provided with a diagram, which shows the connection of the other conductors, or be provided with the following text: “For tilslutning af de øvrige ledere, se medfølgende installationsvejledning.”		N
1.7.2.1	**Germany** (Gesetz über technische Arbeitsmittel und Verbraucherprodukte (Geräte- und Produktsicherheitsgesetz – GPSG) [Law on technical labour equipment and consumer products], of 6th January 2004, Section 2, Article 4, Clause (4), Item 2). If for the assurance of safety and health certain rules during use, amending or maintenance of a technical labour equipment or readymade consumer product are to be followed, a manual in German language has to be delivered when placing the product on the market. Of this requirement, rules for use even only by SERVICE PERSONS are not exempted.		P
1.7.5	**Denmark** (Heavy Current Regulations) With the exception of CLASS II EQUIPMENT provided with a socket outlet in accordance with the Heavy Current Regulations, Section 107-2-D1, Standard Sheet DK 1-4a, CLASS II EQUIPMENT shall not be fitted with socket-outlets for providing power to other equipment.		N
1.7.13	**Switzerland** (Ordinance on chemical hazardous risk reduction SR 814.81, Annex 2.15 Batteries) Annex 2.15 of SR 814.81 applies for batteries.		N
5.1.7.1	**Denmark** (Heavy Current Regulations, Chapter 707, clause 707.4) TOUCH CURRENT measurement results exceeding 3,5 mA r.m.s. are permitted only for PERMANENTLY CONNECTED EQUIPMENT and PLUGGABLE EQUIPMENT TYPE B.		N

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Clause	Requirement + Test	Result - Remark	Verdict

1.5.1	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity[1])
Top panel	CHIMEI	PA765A	V-0, Min 80℃, Min thickness 2.1mm	UL94	UL E56070
(Alternate)	LG	AF312C	V-0, Min 70℃, Min thickness 2.5mm	UL94	UL E67171
Metal enclosure	--	Painted steel	Min 1.5 mm thickness	--	--
Main transformer (two provided, for model APC2048E)	CSCCN	080-49909-00	Class H		Tested with equipment
Main transformer (two provided, for model APC3048E)	CSCCN	080-49889-00	Class H		Tested with equipment
Main transformer (two provided, for model APC4048E)	CSCCN	080-49882-00	Class H		Tested with equipment
Main transformer (two provided, for model APC5048E)	CSCCN	080-49902-00	Class H		Tested with equipment
Main transformer (two provided, for model APC6048E)	CSCCN	080-49902-00	Class H	--	Tested with equipment
Current transformer (CT1)	Click	080-20338-00	Class B	--	Tested with equipment
Transformer (TX06)	Click	080-49887-00	Class B	--	Tested with equipment
Terminal block	GOSUN	GSS500	--	--	Tested with equipment
Input G, L and n wire	Various	1015	10AWG, 105	--	UL
Input/output breaker	KUOYUH	98 Series	125/250VAC 50/60Hz, 30A	--	TUV, UL

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Clause	Requirement + Test	Result - Remark	Verdict

DC Fan	JAMICON, Kaimei electronic corp.	JF0925H1UMAR	12V, 0.42A	--	TUV, UL
Capacitor (C17, C32)	Various	Various	X2 type, 2.2uF, 275Vac	IEC 60384-14	VDE
Choke (L2)	Click	082-10205-00	130℃	--	Tested with equipment
Capacitor (C9, C10, C18, C19, C30, C34)	Various	Various	Y2 type, 10000pF, 250Vac	IEC 60384-14	VDE
Relay (RY01)	SONG CHUAN	855AP-1A-C	250V, 30A, Coil 12V	--	TUV, UL
PCB	Various	Various	V-0, 130℃	--	UL
Switch	Zhang Jia Gang Hua Feng Electronic Connector & Component Co. Ltd.	HF-606	250V, 6A	VDE 0630	VDE, CSA, UL
[1]) An asterisk indicates a mark which assures the agreed level of surveillance					
Supplementary information:					

1.6.2	TABLE: Electrical data (in normal conditions)					P
U (V)	I (A)	Irated (A)	P (W)	Fuse #	Ifuse (A)	Condition/status
Tested on model APC6048E						
198V/ 50Hz	30.9	--	6286	Breaker	--	Charging of empty batteries and rated output load.
220/ 50Hz	27.8	40	6288	Breaker	--	Charging of empty batteries and rated output load.
240V/ 50Hz	25.2	40	6262	Breaker	--	Charging of empty batteries and rated output load.
264V/ 50Hz	24.2	--	6255	Breaker	--	Charging of empty batteries and rated output load.
198V/ 60Hz	30.8	--	6276	Breaker	--	Charging of empty batteries and rated output load.
220/ 60Hz	27.6	40	6271	Breaker	--	Charging of empty batteries and rated output load.
240V/ 60Hz	25.0	40	6255	Breaker	--	Charging of empty batteries and rated output load.
264V/ 60Hz	24.1	--	6251	Breaker	--	Charging of empty batteries and rated output load.
Tested on model APC5048E						

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Clause	Requirement + Test	Result - Remark	Verdict

198V/ 50Hz	25.6	--	5273	Breaker	--	Charging of empty batteries and rated output load.
220/ 50Hz	23.2	40	5242	Breaker	--	Charging of empty batteries and rated output load.
240V/ 50Hz	21.2	40	5266	Breaker	--	Charging of empty batteries and rated output load.
264V/ 50Hz	19.4	--	5241	Breaker	--	Charging of empty batteries and rated output load.
198V/ 60Hz	25.6	--	5275	Breaker	--	Charging of empty batteries and rated output load.
220/ 60Hz	23.1	40	5242	Breaker	--	Charging of empty batteries and rated output load.
240V/ 60Hz	20.9	40	5240	Breaker	--	Charging of empty batteries and rated output load.
264V/ 60Hz	19.2	--	5236	Breaker	--	Charging of empty batteries and rated output load.
Tested on model APC4048E						
198V/ 50Hz	20.6	--	4257	Breaker	--	Charging of empty batteries and rated output load.
220/ 50Hz	18.6	30	4272	Breaker	--	Charging of empty batteries and rated output load.
240V/ 50Hz	17.1	30	4283	Breaker	--	Charging of empty batteries and rated output load.
264V/ 50Hz	16.1	--	4289	Breaker	--	Charging of empty batteries and rated output load.
198V/ 60Hz	20.7	--	4260	Breaker	--	Charging of empty batteries and rated output load.
220/ 60Hz	18.6	30	4269	Breaker	--	Charging of empty batteries and rated output load.
240V/ 60Hz	17.1	30	4282	Breaker	--	Charging of empty batteries and rated output load.
264V/ 60Hz	16.1	--	4288	Breaker	--	Charging of empty batteries and rated output load.
Tested on model APC3048E						
198V/ 50Hz	15.8	--	3272	Breaker	--	Charging of empty batteries and rated output load.
220/ 50Hz	14.2	30	3252	Breaker	--	Charging of empty batteries and rated output load.
240V/ 50Hz	12.6	30	3245	Breaker	--	Charging of empty batteries and rated output load.
264V/ 50Hz	12.0	--	3240	Breaker	--	Charging of empty batteries and rated output load.
198V/ 60Hz	15.8	--	3267	Breaker	--	Charging of empty batteries and rated output load.

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Clause	Requirement + Test	Result - Remark	Verdict

220/ 60Hz	14.1	30	3241	Breaker	--	Charging of empty batteries and rated output load.
240V/ 60Hz	12.6	30	3238	Breaker	--	Charging of empty batteries and rated output load.
264V/ 60Hz	12.1	--	3230	Breaker	--	Charging of empty batteries and rated output load.
Tested on model APC2048E						
198V/ 50Hz	11.1	--	2250	Breaker	--	Charging of empty batteries and rated output load.
220/ 50Hz	9.9	20	2277	Breaker	--	Charging of empty batteries and rated output load.
240V/ 50Hz	9.1	20	2279	Breaker	--	Charging of empty batteries and rated output load.
264V/ 50Hz	8.7	--	2283	Breaker	--	Charging of empty batteries and rated output load.
198V/ 60Hz	11.1	--	2258	Breaker	--	Charging of empty batteries and rated output load.
220/ 60Hz	9.96	20	2270	Breaker	--	Charging of empty batteries and rated output load.
240V/ 60Hz	9.2	20	2295	Breaker	--	Charging of empty batteries and rated output load.
264V/ 60Hz	8.8	--	2299	Breaker	--	Charging of empty batteries and rated output load.
Supplementary information:						

1.7.11	TABLE: durability of marking test		P
Location	Checked by	Times	Result
External enclosure	Water	15s	No any curling and still legibility
External enclosure	Petroleum spirit	15s	No any curling and still legibility
Supplementary information:			

2.1.1.5 c1)	TABLE: max. V, A, VA test (Energy hazardous measurement)			N
Voltage (rated) (V)	Current (rated) (A)	Voltage (max.) (V)	Current (max.) (A)	VA (max.) (VA)
Supplementary information: Battery terminal				

2.1.1.5 c2)	TABLE: stored energy (Energy hazardous measurement)	N

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Clause	Requirement + Test	Result - Remark	Verdict

Capacitance C (µF)	Voltage U (V)	Energy E (J)
Supplementary information:		

2.1.1.7	TABLE: Capacitance discharge test		P
Condition	τ calculated (s)	τ measured (s)	Comments
L-N	--	2.9ms	Vp=362V, 37%Vp=133.2V
Supplementary information: Supplied with 264V/50Hz, test without load. Tested on model APC6048E			

2.2	TABLE: evaluation of voltage limiting components in SELV circuits		P
Component (measured between)	max. voltage (V) (normal operation)		Voltage Limiting Components
	V peak	V d.c.	
Charger winding of main transformer	79.0V	--	--
Battery terminal	--	56.8V	--
Secondary winding of current transfomrer CT1	8.7V	--	--
Fault test performed on voltage limiting components	Voltage measured (V) in SELV circuits (V peak or V d.c.)		
Q21 d-s, s-c	0V		
Secondary winding of current transfomrer CT1, s-c	0V		
Supplementary information: S-c=Short circuit. Tested on model APC6048E			

2.4.2	TABLE: Limited current circuit measurement				P
Location : L-N of input					
Condition	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments
Normal	2.2V	1.1	50kHz	35	A 2000 ohm non-inductive resistor used for Frequency > 1kHz, Annex D used for 60Hz
Q04 c-e shorted	2.4V	1.2	50kHz	35	Ditto
Location : L-G of input					

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Clause	Requirement + Test	Result - Remark	Verdict

Condition	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments
Normal	5.0	2.5	50kHz	35	A 2000 ohm non-inductive resistor used for Frequency > 1kHz, Annex D used for 60Hz
Q04	5.2	2.6	50kHz	35	Ditto
Location : N-G of input					
Condition	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments
Normal	6.8	3.4	5k0Hz	35	A 2000 ohm non-inductive resistor used for Frequency > 1kHz, Annex D used for 60Hz
Q04 c-e shorted	7.0	3.5	5k0Hz	35	Ditto
Supplementary information: Supplied with 264V/50Hz. Tested on model PSW7 6024E					

2.5	TABLE: limited power sources			N
Circuit output tested:				
Measured Uoc (V) with all load circuits disconnected: Uoc=				
Measuring position	I_{sc}(A)		VA	
	Meas.	Limit	Meas.	Limit
Supplementary information: S-c=Short circuit, O-c=Open circuit				

2.6.3.4	TABLE: ground continue test			P
Location	Resistance measured (mΩ)	Voltage measured (V)	Current applied (A)	Duration (min)
G pin of Inlet to earthing enclosure	22	1.32	60	4
Supplementary information: Tested on model APC6048E				

2.10.2	TABLE: determination of operating voltage measurement				N
Component	Location		Peak Voltage (Vac)	RMS Voltage (Vac)	Comments
	From	To			

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

2.10.3 and 2.10.4	TABLE: Clearance and creepage distance measurements					P
Clearance (cl) and creepage distance (cr) at/of/between:	U peak (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)
Line and neutral trace under C17	<420	<250	2.0	6.2	2.5	6.2
Line and neutral trace under C20	<420	<250	2.0	6.5	2.5	6.5
Primary trace to earthed trace	<420	<250	2.0	>2.5	2.5	>2.5
Primary component to chassis	<420	<250	2.0	>5	2.5	>5
Primary trace to secondary trace under CT1	<420	<250	4.0	8.3	5.0	8.3
Primary trace to secondary trace under RY1	<420	<250	4.0	8.4	5.0	8.4
Coil to contacts of RY1 for reinforce insulation	<420	<250	4.0	>5.0	5.0	>5.0
Supplementary information: 1. See appended table C.2 for internal distances of transformer. 2. 10 N Test performed component and internal wire.						

2.10.5	TABLE: Distance through insulation measurements					P
Distance through insulation (DTI) at/of:		U peak (V)	U rms (V)	Test voltage (V)	Required DTI (mm)	DTI (mm)
Relay enclosure (reinforced insulation)		<420	<250	3000	0.4	≥0.4 1)
CT1 tube(reinforced insulation)		<420	<250	3000	0.4	≥0.4 1)
Supplementary information: 1) Approved component. For details refer to CDF						

4.3.8	TABLE: Batteries		N
The tests of 4.3.8 are applicable only when appropriate battery data is not available			N
Is it possible to install the battery in a reverse polarity position?			N
	Non-rechargeable batteries	Rechargeable batteries	

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	Discharging		Un-intentional charging	Charging		Discharging		Reversed charging	
	Meas. current	Manuf. Specs.		Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.
Max. current during normal condition	--	--	--	--	--	--	--	--	--
Max. current during fault condition	--	--	--	--	--	--	--	--	--

Test results:		Verdict
- Chemical leaks		N
- Explosion of the battery		N
- Emission of flame or expulsion of molten metal		N
- Electric strength tests of equipment after completion of tests		N
Supplementary information:		

4.5	TABLE: Thermal requirements						P
	Supply voltage (V) ……………….:	198V	264V	Dis-charge mode	--	--	–
	Ambient T_{min}(°C) ……………….:	--	--	--	--	--	–
	Ambient T_{max}(°C) ……………….:	--	--	--	--	--	–
Maximum measured temperature T of part/at:		T (°C)					Allowed T_{max} (°C)
Tested on model APC6048E							
Input terminal block		31.3	32.5	59.1	--	--	105
Battery terminal		32.6	34.6	27.0	--	--	105
Input breaker		41.1	42.0	29.0	--	--	85
Input “L” wire		57.0	55.9	28.0	--	--	105
Battery wire (red)		53.5	60.0	29.0	--	--	105
Top panel		30.7	31.9	29.1	--	--	95
Top metal enclosure		32.7	33.8	27.5	--	--	75
RY01 coil		79.1	80.3	28.7	--	--	130
L2 coil		90.9	98.3	29.5	--	--	130
Y2-Capacitor C19		70.5	81.3	28.1	--	--	85

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Clause	Requirement + Test	Result - Remark	Verdict

X2-Capacitor C20	48.1	47.4	29.7	--	--	100
TX06 winding	50.1	49.0	30.5	--	--	110
CT1 winding	54.6	55.3	41.9	--	--	110
PCB near Q2	32.6	33.0	38.9	--	--	130
Y2-Capacitor C9	29.6	30.2	27.7	--	--	85
Y2-Capacitor C10	30.2	30.0	27.3	--	--	85
PCB near Q5	34.2	33.6	39.3	--	--	130
The primary winding of main transformer 1	43.8	44.8	37.4	--	--	130
The secondary winding of main transformer 1	41.8	42.4	40.0	--	--	130
The core of main transformer 1	47.6	50.6	36.1	--	--	--
The primary winding of main transformer 2	39.1	40.3	36.1	--	--	130
The secondary winding of main transformer 2	37.2	38.2	38.5	--	--	130
Ambient	29.8	32.4	25.7	--	--	--
Tested on model APC3048E						
Input terminal block	29.8	29.8	40.8	--	--	105
Battery terminal	30.8	31.4	27.6	--	--	105
Input breaker	31.5	32.4	30.7	--	--	85
Input “L” wire	47.7	41.5	32.2	--	--	105
Battery wire (red)	47.6	44.3	34.6	--	--	105
Top panel	28.4	28.9	28.9	--	--	95
Top metal enclosure	32.7	31.8	31.0	--	--	75
RY01 coil	68.6	65.9	35.8	--	--	130
L2 coil	72.8	70.7	32.8	--	--	130
Y2-Capacitor C19	57.8	55.6	28.9	--	--	85
X2-Capacitor C20	36.9	37.7	32.3	--	--	100
TX06 winding	43.5	42.9	39.7	--	--	110
CT1 winding	44.3	42.0	41.3	--	--	110
PCB near Q2	32.6	32.1	45.2	--	--	130
Y2-Capacitor C9	28.8	29.0	32.3	--	--	85
Y2-Capacitor C10	30.9	29.6	31.2	--	--	85
PCB near Q5	34.5	31.9	45.5	--	--	130
The primary winding of main transformer	41.0	39.8	42.3	--	--	130
The secondary winding of main transformer	40.1	38.6	40.5	--	--	130
The core of main transformer	47.8	45.7	42.6	--	--	--
Ambient	25.2	24.8	24.7	--	--	--
Supplementary information:						

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Temperature T of winding:	t_1 (°C)	R_1 (Ω)	t_2 (°C)	R_2 (Ω)	T (°C)	Allowed T_{max} (°C)	Insulation class

Supplementary information:

1) T shall not exceed (Tmax + Tamb – Tma), see clause 1.4.12.

   T: is the temperature of the given part measured under the prescribed test conditions;

   Tmax: is the maxnmum temperature specified for compliance with the test;

   Tamb: is the ambient temperature during test;

   Tma: is the maximum ambient temperature during permitted by the manufacturer's specification, see below 2).

2) The maximum ambient temperature is 40℃.

4.5.5	TABLE: Ball pressure test of thermoplastic parts		P
	Allowed impression diameter (mm) .... :	≤ 2 mm	–

Part	Test temperature (°C)	Impression diameter (mm)
CT1 Bobbin	125	0.8
Input terminal block	125	0.8
Battery terminal	125	1.2
Supplementary information:		

4.7	TABLE: Resistance to fire				P
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class	Evidence
Top panel					
Supplementary information:					

4.6.1 and 4.6.2	TABLE: openings	P
Location	Size (mm)	Comments
Top	None	No openings
Bottom	None	No openings
Side	2.9mm Max.	960 provided
Front	None	No openings
Back	--	Only DC fan ventilation openings provided on back. Metal net provide as fan guard.

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Supplementary information:

5.1.6	TABLE: touch current measurement		P
Measured between:	Measured (mA)	Limit (mA)	Comments/conditions
Live – Enclosure	2.2	3.5	Normal load condition.
Neutral – Enclosure	2.1	3.5	Normal load condition.
Live – secondary circuit	0.08	0.25	Normal load condition.
Neutral –secondary circuit	0.07	0.25	Normal load condition.
supplementary information: Vin =264V, Tested on model PSW7 6024E			

5.2	TABLE: Electric strength tests, impulse tests and voltage surge tests		P
Test voltage applied between:	Voltage shape (AC, DC, impulse, surge)	Test voltage (V)	Breakdown Yes/No
Primary circuit and secondary circuit	AC	3000	No
Primary circuit and enclosure	AC	1500	No
Primary winding and secondary winding of main tranformer	AC	3000	No
Primary winding and core of main tranformer	AC	1500	No
Primary winding and secondary winding of CT1	AC	3000	No
Primary winding and core of CT1	AC	3000	No
2 layers insulating tape used in CT1 transformer	AC	3000	No
1 layers insulating tape used in main transformer	AC	3000	No
Supplementary information:			

5.3	TABLE: Fault condition tests					P
	Ambient temperature (°C) ....:				25, if not specify.	–
	Power source for EUT: Manufacturer, model/type, output rating ....:				APC6048E, Refer to page 2.	–
Component No.	Fault	Supply voltage (V)	Test time	Fuse #	Fuse current (A)	Observation
Q04 c-e	s-c	Battery mode	10min	Breaker	--	Normal operation, no damage, no hazards.
Secondary winding of CT1	s-c	240V	10min	Breaker	27.8	Normal operation, no damage, no hazards.

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Charger winding of Main transformer	s-c	240V	10min	Breaker	0.9	UPS transfer to fault mode, no output. No hazard.
D30	s-c	240V	1s	Breaker	0	Unit shutdown. No hazard.
D28	s-c	240V	1s	Breaker	0	Unit shutdown. No hazard.
C5	s-c	Battery mode	1s	--	--	Unit shutdown. No hazard.
Q10 d-s	s-c	240V	10min	Breaker	--	UPS transfer to fault mode, no output. No hazard.
Q21	s-c	Battery mode	1s	Breaker	--	Q15, Q19, Q7, Q2, Q11, Q12, Q8, Q16, Q4, Q20, Q32, Q17, Q13, Q6, Q18 and Q14 damaged. no output. No hazard.
Battery terminal	s-c	Battery mode	1s	--	--	Unit shutdown. No hazard.
AC output	o-l	240V	2h	Breaker	--	UPS shutdown when loaded to 110% rated load. Maximum temperature was: Main transformer primary winding = 48.7°C, Main transformer secondary winding = 46.4°C, CT1 winding = -55.6°C, ambient = 27.4°C. No hazard.
AC output	o-l	Battery mode	--	--	--	UPS shutdown when loaded to 125% rated load. Maximum temperature was: Main transformer primary winding = 38.9°C, Main transformer secondary winding = 40.3°C, CT1 winding = -42.3°C, ambient = 25.1°C. No hazard.
AC output	s-c	240V	1s	Breaker	--	UPS transfer to fault mode, cann't recoveable, no hazards.
AC output	s-c	Battery mode	1s	--	--	UPS transfer to fault mode, recoveable, no hazards.
Openings	Blocked	240V	2h	Breaker	27.8	Normal operation, no damage, no hazards. Maximum temperature was: Main transformer primary winding = 50.1°C, Main transformer secondary winding = 47.8°C, CT1 winding = -45.7°C, ambient = 25.4°C. No hazard.
Openings	Blocked	Battery mode	--	--	--	UPS discharge till stutdown. No hazards. Maximum temperature was: Main transformer primary winding = 39.3°C, Main transformer secondary winding = 41.2°C, CT1 winding = -46.0°C, ambient = 25.5°C. No hazard.

EN 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict

Fan	Locked	240V	1s	Breaker	27.9	Normal operation, no damage, no hazards. Maximum temperature was: Main transformer primary winding = 63.8°C, Main transformer secondary winding = 61.3°C, CT1 winding = -46.8°C, ambient = 26.0°C. No hazard.
Fan	Locked	Battery mode	--	--	--	UPS discharge till stutdown. No hazards. Maximum temperature was: Main transformer primary winding = 51.8°C, Main transformer secondary winding = 53.8°C, CT1 winding = -45.7°C, ambient = 25.8°C. No hazard.
Supplementary information: s-c=short circuit, o-c=open circuit, o-l=overload Ater all fault condition test, the samples passed the dielectric voltage test.						

C.2	TABLE: transformers						P
Loc.	Tested insulation	Working voltage peak / V (2.10.2)	Working voltage rms / V (2.10.2)	Required electric strength (5.2)	Required clearance / mm (2.10.3)	Required creepage distance / mm (2.10.4)	Required distance thr. insul. (2.10.5)
Main transfo mer	Reinforced	<420	<250	3000Vac	4.0	5.0	*
Main transfo mer	Basic	<420	<250	1500Vac	2.0	2.5	*
CT1	Reinforced	<420	<250	3000Vac	4.0	5.0	*
Loc.	Tested insulation			Test voltage/ V	Measured clearance / mm	Measured creepage dist./ mm	Measured distance thr. insul. / mm; number of layers
Main transfo mer	Reinforced: Primary - Secondary			3000Vac	>5.0	>5.0	2 layers
Main transfo mer	Basic: Primary / core-Secondary			1500Vac	>2.5	>2.5	2 layers
CT1	Reinforced: Primary - Secondary			3000Vac	>5.0	>5.0	>0.4
CT1	Reinforced: Primary - core			3000Vac	>5.0	>5.0	>0.4
supplementary information: * 2 layers or 3 layers or Annex U							

Pictures

Fig. 1 Overview for model APC6048E (1)

Fig. 2 Overview for model APC6048E (2)

Pictures

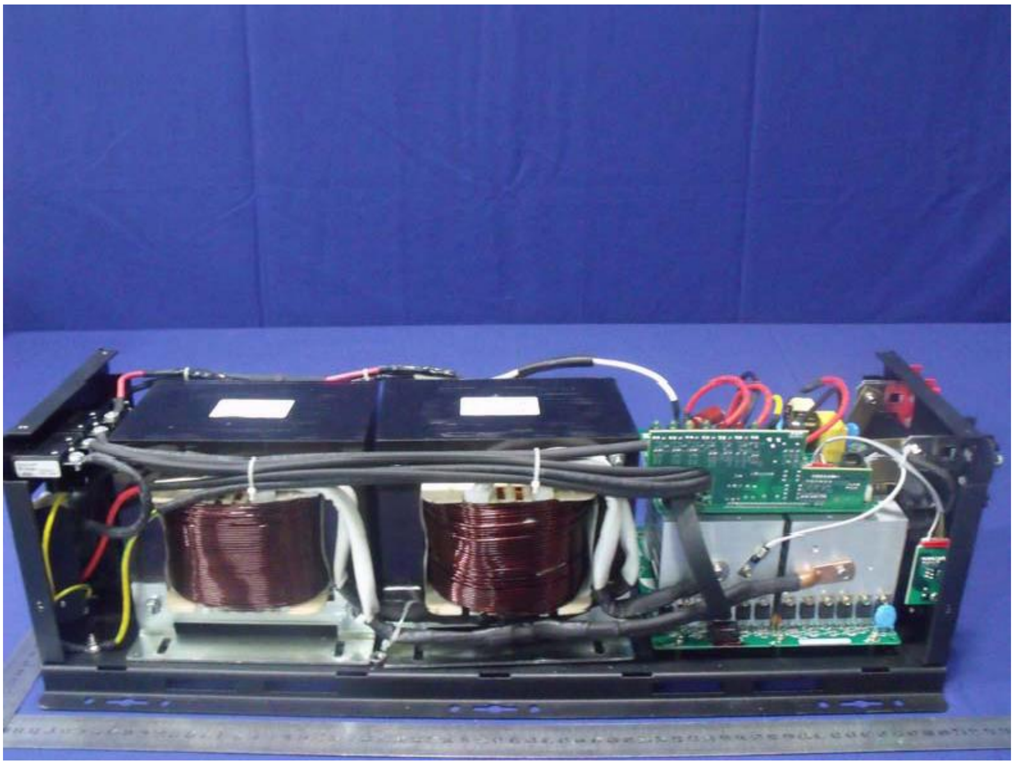


Fig. 3 Inside view for model APC6048E

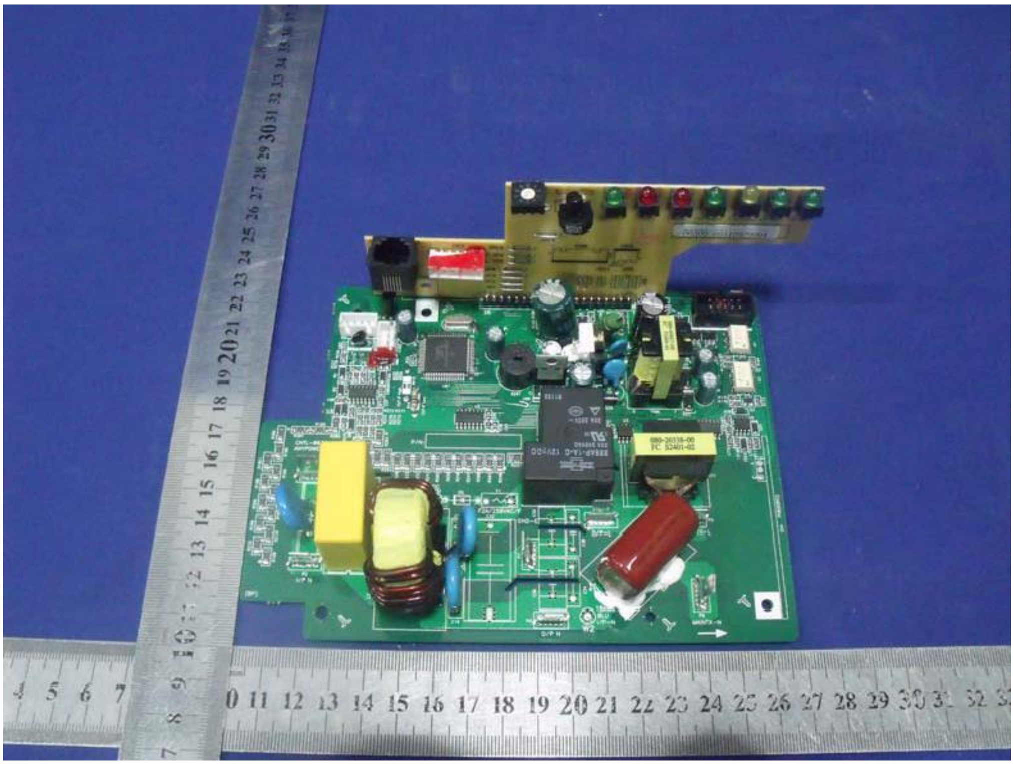


Fig. 4 PCB for model APC6048E, components side view

Pictures

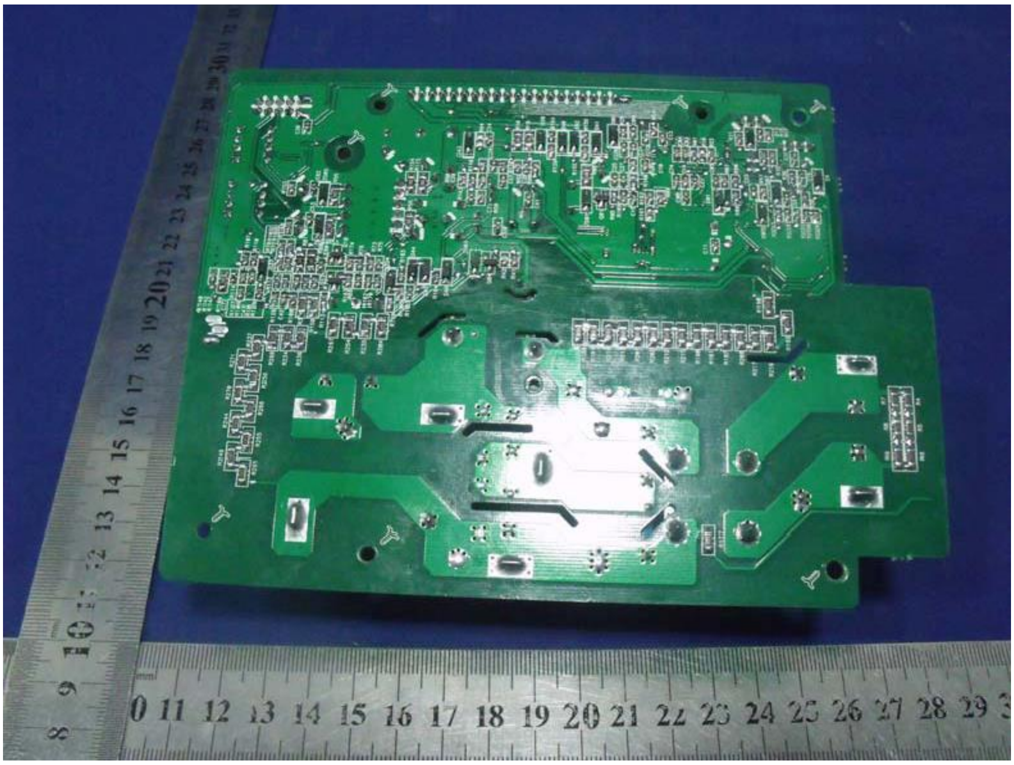


Fig. 5 PCB for model APC6048E, traces side view

EMC TEST REPORT
for
Tortech Pty Ltd

Inverter
Model No.: APC1012E, APC1512E, APC2012E, APC3012E

Prepared by : Shenzhen EMTEK Co., Ltd
Address : Bldg 69, Majialong Industry Zone,
Nanshan District, Shenzhen, Guangdong, China

Tel: (0755) 26954280
Fax: (0755) 26954282

Report Number : ES111008005E
Date of Test : October 08, 2011 to October 15, 2011
Date of Report : October 15, 2011

TABLE OF CONTENT

Test Report Description Page

TEST REPORT DESCRIPTION

Applicant	:	Tortech Pty Ltd
EUT	:	Inverter
Model No.	:	APC1012E, APC1512E, APC2012E, APC3012E

Measurement Procedure Used:
EN55022: 2006+A1:2007,
EN 61000-3-2:2006+A1:2009+A2:2009
EN 61000-3-3:2008
EN55024: 1998+A1: 2001+A2: 2003
(EN61000-4-2: 2009, EN61000-4-3: 2006+A1:2008+A2:2010, EN61000-4-4: 2004+A1:2010, EN61000-4-5: 2006, EN61000-4-6: 2009, EN61000-4-8: 2010, EN61000-4-11: 2004)

The device described above is tested by SHENZHEN EMTEK CO., LTD. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and SHENZHEN EMTEK CO., LTD. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN55022, EN61000-3-2, EN61000-3-3 and EN55024 requirements.
This report applies to above tested sample only and shall not be reproduced in part without written approval of SHENZHEN EMTEK CO., LTD.

Date of Test	:	October 08, 2011 to October 15, 2011
Prepared by	:	(Engineer)
Reviewer	:	(Project Manager)
Approved & Authorized Signer:		(Manager)

SHENZHEN EMTEK CO., LTD. TESTING

1. SUMMARY OF TEST RESULT

EMISSION			
Description of test item	Standard	Limits	Results
Conducted disturbance at mains terminals	EN55022: 2006+A1: 2007	Class A	Pass
Radiated Disturbance	EN55022: 2006+A1: 2007	Class A	Pass
Harmonic current emissions	EN61000-3-2:2006+A1: 2009+A2:2009	Class A	Pass
Voltage fluctuation and flicker	EN61000-3-3:2008	Section 5	Pass
Immunity			
Description of test item	Basic Standard	Performance Criteria	Results
Electrostatic Discharge (ESD)	EN61000-4-2: 2009	B	Pass
Radio-frequency, Continuous radiated disturbance	EN61000-4-3: 2006+A1:2008+A2:2010	A	Pass
EFT/B Immunity	EN61000-4-4: 2004+A1:2010	B	Pass
Surge Immunity	EN61000-4-5: 2006	B	Pass
Conducted RF Immunity	EN61000-4-6: 2009	A	Pass
Power frequency magnetic field	EN61000-4-8: 2010	A	Pass
Voltage dips, >95% reduction	EN61000-4-11:2004	B	Pass
Voltage dips, 30% reduction		C	Pass
Voltage interruptions		C	Pass
Note: N/A is an abbreviation for Not Applicable.			

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT	:	Inverter
Model Number	:	APC1012E, APC1512E, APC2012E, APC3012E (Note: This series of Inverter generally uses the same circuit diagrams. Unless otherwise specified, the tests are conducted on model APC3012E.)
Input and Output	:	For model APC1012E: INPUT: 220~240VAC, 50/60Hz, 10A MAX, 1Ø OUTPUT: 220~240VAC, 50/60Hz, 1000W, 1Ø BATTERY: 12VDC For model APC1512E: INPUT: 220~240VAC, 50/60Hz, 10A MAX, 1Ø OUTPUT: 220~240VAC, 50/60Hz, 1500W, 1Ø BATTERY: 12VDC For model APC2012E: INPUT: 220~240VAC, 50/60Hz, 10A MAX, 1Ø OUTPUT: 220~240VAC, 50/60Hz, 2000W, 1Ø BATTERY: 12VDC For model APC3012E: INPUT: 220~240VAC, 50/60Hz, 30A MAX, 1Ø OUTPUT: 220~240VAC, 50/60Hz, 3000W, 1Ø BATTERY: 12VDC
Test Voltage	:	AC230V/50Hz
Applicant	:	Tortech Pty Ltd
Date of receiver	:	October 08, 2011
Date of Test	:	October 08, 2011 to October 15, 2011

2.2. Description of Test Facility

Site Description

EMC Lab.	:	Accredited by CNAS, 2010.10.29 The certificate is valid until 2013.10.28 The Laboratory has been assessed and proved to be in compliance with CNAS-CL01: 2006(identical to ISO/IEC17025: 2005) The Certificate Registration Number is L2291 Accredited by TUV Rheinland Shenzhen, 2010.5 The Laboratory has been assessed according to the requirements ISO/IEC 17025. Accredited by FCC, October 28, 2010 The Certificate Registration Number is 406365. Accredited by Industry Canada, March 5, 2010 The Certificate Registration Number is 46405-4480
Name of Firm	:	SHENZHEN EMTEK CO., LTD
Site Location	:	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

2.3. Measurement Uncertainty

Radiation Emission Uncertainty	:	3.3dB (3m Chamber)
Conduction Emission Uncertainty	:	2.6dB

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1. For Power Line Conducted Emission

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCS30	828985/018	May 29, 2011	1 Year
2.	L.I.S.N.	Schwarzbeck	NNLK8129	8129203	May 29, 2011	1 Year
3.	50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
4.	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	May 29, 2011	1 Year
5.	Voltage Probe	Rohde & Schwarz	TK9416	N/A	May 29, 2011	1 Year
6.	I.S.N	Rohde & Schwarz	ENY22	1109.9508.02	May 29, 2011	1 Year

3.2. For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 29, 2011	1 Year
2.	Pre-Amplifier	HP	8447D	2944A07999	May 29, 2011	1 Year
3.	Bilog Antenna	Schwarzbeck	VULB9163	142	May 29, 2011	1 Year
4.	Loop Antenna	ARA	PLA-1030/B	1029	May 29, 2011	1 Year
5.	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	May 29, 2011	1 Year
6.	Horn Antenna	Schwarzbeck	BBHA 9120	D143	May 29, 2011	1 Year
7.	Cable	Schwarzbeck	AK9513	ACRX1	May 29, 2011	1 Year
8.	Cable	Rosenberger	N/A	FP2RX2	May 29, 2011	1 Year
9.	Cable	Schwarzbeck	AK9513	CRPX1	May 29, 2011	1 Year
10.	Cable	Schwarzbeck	AK9513	CRRX2	May 29, 2011	1 Year

3.3. For Harmonic Current / Flicker Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	AC Power Source	California Instruments	5001iX-CTS-400-413	72795	May 29, 2011	1 Year
2.	PC	N/A	P2L97	N/A	May 29, 2011	N/A

3.4. For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	TESEQ AG	NSG 437	000409	May 29, 2011	1 Year

3.5.For RF Strength Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Power Meter. Dual Channel	BOONTON	4232A	10539	May 29, 2011	1 Year
2.	50ohm Diode Power Sensor	BOONTON	51011EMC	34236/34238	May 29, 2011	1 Year
3.	Broad-Band Horn Antenna	SCHWARZBECK	BBHA 9120 L3F	332	May 29, 2011	1 Year
4.	Power Amplifier	PRANA	AP32MT215	N/A	May 29, 2011	1 Year
5.	Power Amplifier	MILMEGA	AS0102-55	N/A	May 29, 2011	1 Year
6.	Signal Generator	AEROFLEX	2023B	N/A	May 29, 2011	1 Year
7.	Field Strength Meter	HOLADAY	HI-6005	N/A	May 29, 2011	1 Year
8.	RS232 Fiber Optic Modem	HOLADAY	HI-4413P	N/A	May 29, 2011	1 Year
9.	Log.-Per. Antenna	SCHWARZBECK	VULP 9118E	N/A	May 29, 2011	1 Year

3.6.For Electrical Fast Transient /Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Burst Tester	HAEFELY	PEFT4010	080981-16	May 29, 2011	1Year
2.	Coupling Clamp	HAEFELY	IP-4A	147147	May 29, 2011	1Year

3.7.For Surge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Surge Controller	HAEFELY	Psurge 8000	174031	May 29, 2011	1Year
2.	Impulse Module	HAEFELY	PIM 100	174124	May 29, 2011	1Year
3.	Coupling Decoupling Filter	HAEFELY	PCD 130	172181	May 29, 2011	1Year
4.	Coupling Module	HAEFELY	PCD122	174354	May 29, 2011	1Year
5.	Surge Impulse Module	HAEFELY	PIM 120	174435	May 29, 2011	1Year
6.	Coupling Module	HAEFELY	PCD 126A	174387	May 29, 2011	1Year
7.	Impulse Module	HAEFELY	PIM 110	174391	May 29, 2011	1Year

3.8.For Injected Current Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Simulator	EMTEST	CWS500C	0900-12	May 29, 2011	1Year
2.	CDN	EMTEST	CDN-M2	5100100100	May 29, 2011	1Year
3.	CDN	EMTEST	CDN-M3	0900-11	May 29, 2011	1Year
4.	Injection Clamp	EMTEST	F-2031-23 MM	368	May 29, 2011	1Year
5.	Attenuator	EMTEST	ATT6	0010222A	May 29, 2011	1Year

3.9.For Magnetic Field Immunity Test

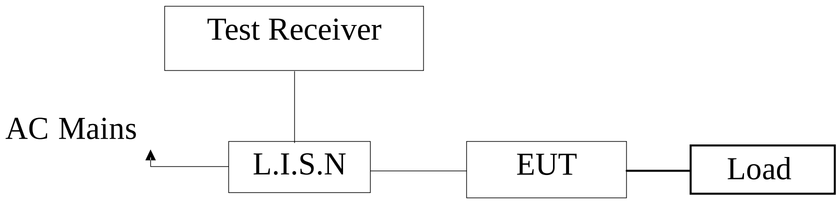
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Magnetic Field Tester	HAEFELY	MAG100	250040.1	May 29, 2011	1Year

3.10.For Voltage Dips and Interruptions Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Dips Tester	HAEFELY	Pline1610	083732-12	May 29, 2011	1Year

4. POWER LINE CONDUCTED EMISSION MEASUREMENT

4.1.Block Diagram of Test Setup



(EUT: Inverter)

4.2.Measuring Standard

EN 55022:2006+A1:2007

Power Line Conducted Emission Limits (Class A)

Frequency (MHz)	Limit (dBμV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	79	66
0.50 ~ 30.00	73	60
NOTE1-The lower limit shall apply at the transition frequencies.		

4.3.EUT Configuration on Measurement

The following equipments are installed on Conducted Emission Measurement to meet EN 55022 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

4.4. Operating Condition of EUT

4.4.1.Setup the EUT as shown on Section 4.1.

4.4.2.Turn on the Inverter of all equipments.

4.4.3.Let the EUT work in measuring mode (Full Load) and measure it.

4.5.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided 50ohm-coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN 55022 regulations during conducted emission measurement.
The bandwidth of the field strength meter (R&S Test Receiver ESCS30) is set at 9KHz in 150KHz~30MHz and 200Hz in 9KHz~150KHz.
The frequency range from 150kHz to 30MHz is investigated
All the scanning waveforms are put in Appendix I.

4.6.Measuring Results

PASS.

Please reference to Appendix I.

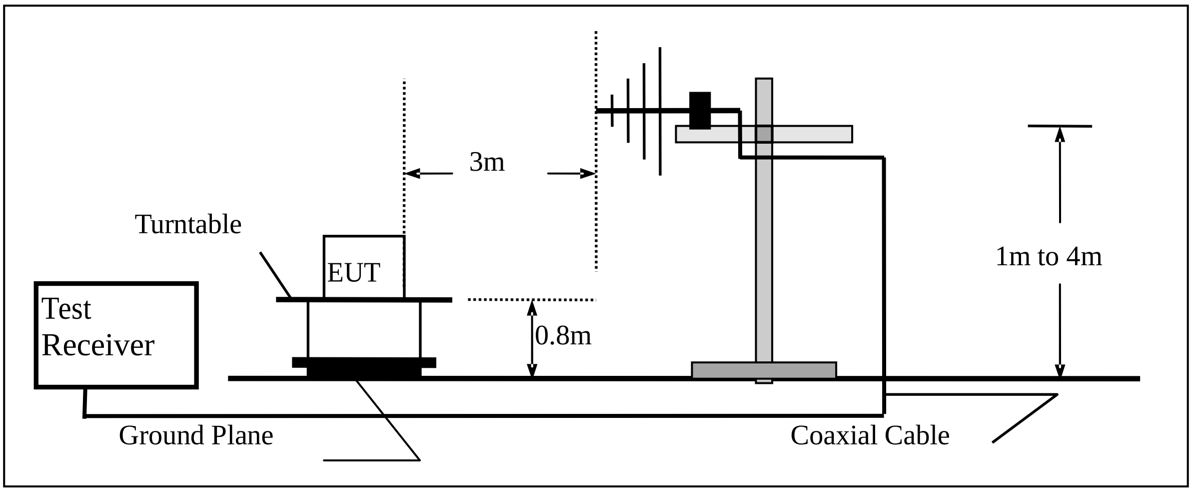
5. RADIATED EMISSION MEASUREMENT

5.1.Block Diagram of Test

5.1.1.Block diagram of connection between the EUT and simulators

(EUT: Inverter)

5.1.2.Block diagram of test setup (In chamber)



(EUT: Inverter)

5.2.Measuring Standard

EN55022: 2006+A1:2007

5.3.Radiated Emission Limits

All emanations from a class A device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dBμV/m)
30 ~ 230	3	50
230 ~ 1000	3	57

Note**:** (1) The smaller limit shall apply at the combination point between two frequency bands.
(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

5.4.EUT Configuration on Test

The EN55022 regulations test method must be used to find the maximum emission during radiated emission measurement.

5.5.Operating Condition of EUT

5.5.1.Turn on the Inverter.

5.5.2.After that, let the EUT work in test mode (Full Load) and measure it.

5.6.Test Procedure

The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

The bandwidth of the Receiver (ESU26) is set at 120kHz.
All the scanning curves are attached in Appendix II.

5.7.Measuring Results

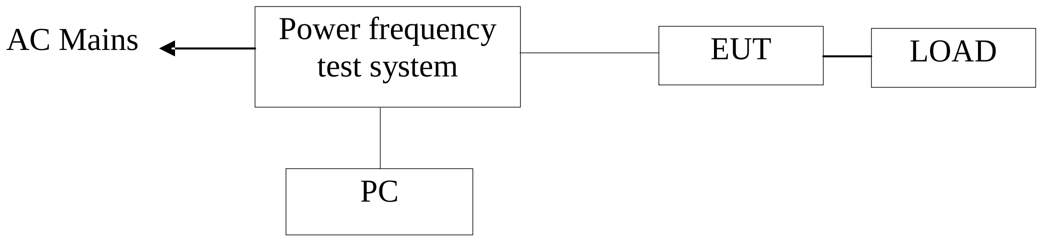
PASS.

The frequency range from 30MHz to 1000MHz is investigated.

Please reference to Appendix II.

6. HARMONIC CURRENT EMISSION MEASUREMENT

6.1 Block Diagram of Test Setup



(EUT: Inverter)

6.2 Measuring Standard

EN 61000-3-2:2006+A1:2009+A2:2009

6.3 Operation Condition of EUT

Same as Section 4.4, except the test setup replaced as Section 6.1.

6.4 Measuring Results

PASS.

Please refer to the following pages.

Test Report

Report title:	HARMONICS
Company Name:	EMTEK
Date of test:	16:34 10.Oct 2011
Measurement file name:	Harmonics_3_2_Ed3 20.rsd
Tester:	JLH
Standard used:	EN/IEC 61000-3-2 Ed.3 Short cyclic Equipment class A <= 200% of the limit
Observation time:	150s
Windows width:	10 periods - (EN/IEC 61000-4-7 Edition 2002)
E. U. T.:	Inverter
MN:	APC3012E

Test Result	
E. U. T.:	PASS
Power Source:	PASS

E. U. T. Result

Harmonic(s) > 200%:	
Order (n):	None
Harmonic(s) with average > 90%:	
Order (n):	None
Harmonic(s) between 150% and 200% during more than 10% of the test time or max. 10min:	
Order (n):	None

Power Source Result

First dataset out of limit:	
DS (time):	None
Harmonic(s) out of limit:	
Order (n):	None

Average harmonic current results

Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
1	4.830	100.000		
2	26.830E-3	0.555	972.00E-3	PASS
3	123.711E-3	2.561	2.07	PASS
4	4.420E-3	0.092	387.00E-3	PASS
5	137.338E-3	2.843	1.03	PASS
6	3.012E-3	0.062	270.00E-3	PASS
7	63.394E-3	1.312	693.00E-3	PASS
8	1.222E-3	0.025	207.00E-3	PASS
9	18.099E-3	0.375	360.00E-3	PASS
10	1.953E-3	0.040	165.60E-3	PASS
11	19.627E-3	0.406	297.00E-3	PASS
12	1.117E-3	0.023	138.00E-3	PASS
13	17.156E-3	0.355	189.00E-3	PASS
14	1.264E-3	0.026	118.29E-3	PASS
15	12.094E-3	0.250	135.00E-3	PASS
16	1.460E-3	0.030	103.50E-3	PASS
17	6.990E-3	0.145	119.11E-3	PASS
18	1.492E-3	0.031	92.00E-3	PASS
19	7.681E-3	0.159	106.58E-3	PASS
20	1.513E-3	0.031	82.80E-3	PASS
21	4.425E-3	0.092	96.43E-3	PASS
22	1.391E-3	0.029	75.28E-3	PASS
23	11.090E-3	0.230	88.05E-3	PASS
24	1.891E-3	0.039	68.99E-3	PASS
25	10.324E-3	0.214	81.00E-3	PASS
26	1.840E-3	0.038	63.69E-3	PASS
27	7.324E-3	0.152	75.00E-3	PASS
28	2.034E-3	0.042	59.14E-3	PASS
29	7.328E-3	0.152	69.83E-3	PASS
30	2.532E-3	0.052	55.20E-3	PASS
31	6.029E-3	0.125	65.32E-3	PASS
32	2.630E-3	0.054	51.75E-3	PASS
33	5.087E-3	0.105	61.36E-3	PASS
34	3.172E-3	0.066	48.71E-3	PASS
35	6.232E-3	0.129	57.86E-3	PASS
36	3.880E-3	0.080	46.00E-3	PASS
37	9.025E-3	0.187	54.73E-3	PASS
38	6.449E-3	0.134	43.58E-3	PASS
39	8.800E-3	0.182	51.92E-3	PASS
40	11.017E-3	0.228	41.40E-3	PASS

Maximum harmonic current results

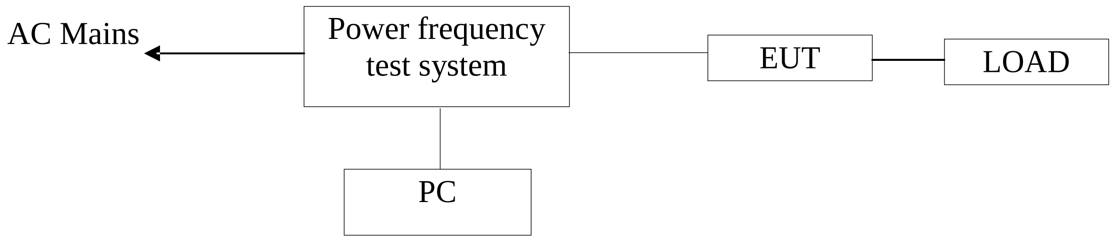
Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
1	4.895	100.000		
2	28.687E-3	0.586	2.16	PASS
3	134.332E-3	2.744	4.60	PASS
4	5.433E-3	0.111	860.00E-3	PASS
5	146.074E-3	2.984	2.28	PASS
6	3.445E-3	0.070	600.00E-3	PASS
7	71.102E-3	1.452	1.54	PASS
8	1.693E-3	0.035	460.00E-3	PASS
9	21.960E-3	0.449	800.00E-3	PASS
10	2.176E-3	0.044	368.00E-3	PASS
11	26.984E-3	0.551	660.00E-3	PASS
12	1.717E-3	0.035	306.66E-3	PASS
13	24.951E-3	0.510	420.00E-3	PASS
14	2.055E-3	0.042	262.86E-3	PASS
15	24.145E-3	0.493	300.00E-3	PASS
16	1.748E-3	0.036	230.00E-3	PASS
17	10.981E-3	0.224	264.70E-3	PASS
18	1.824E-3	0.037	204.44E-3	PASS
19	13.407E-3	0.274	236.84E-3	PASS
20	1.906E-3	0.039	184.00E-3	PASS
21	9.881E-3	0.202	214.28E-3	PASS
22	1.797E-3	0.037	167.28E-3	PASS
23	13.628E-3	0.278	195.66E-3	PASS
24	2.613E-3	0.053	153.32E-3	PASS
25	14.727E-3	0.301	180.00E-3	PASS
26	2.221E-3	0.045	141.54E-3	PASS
27	9.834E-3	0.201	166.66E-3	PASS
28	2.393E-3	0.049	131.42E-3	PASS
29	9.248E-3	0.189	155.18E-3	PASS
30	3.182E-3	0.065	122.66E-3	PASS
31	7.281E-3	0.149	145.16E-3	PASS
32	3.527E-3	0.072	115.00E-3	PASS
33	6.985E-3	0.143	136.36E-3	PASS
34	4.274E-3	0.087	108.24E-3	PASS
35	8.821E-3	0.180	128.58E-3	PASS
36	5.619E-3	0.115	102.22E-3	PASS
37	11.097E-3	0.227	121.62E-3	PASS
38	7.801E-3	0.159	96.84E-3	PASS
39	12.556E-3	0.256	115.38E-3	PASS
40	12.955E-3	0.265	92.00E-3	PASS

Maximum harmonic voltage results

Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	230.57	100.249		
2	42.79E-3	0.019	0.2	PASS
3	199.94E-3	0.087	0.9	PASS
4	43.35E-3	0.019	0.2	PASS
5	61.51E-3	0.027	0.4	PASS
6	34.92E-3	0.015	0.2	PASS
7	70.05E-3	0.030	0.3	PASS
8	32.14E-3	0.014	0.2	PASS
9	87.59E-3	0.038	0.2	PASS
10	20.43E-3	0.009	0.2	PASS
11	37.49E-3	0.016	0.1	PASS
12	12.56E-3	0.005	0.1	PASS
13	68.99E-3	0.030	0.1	PASS
14	15.32E-3	0.007	0.1	PASS
15	62.14E-3	0.027	0.1	PASS
16	31.21E-3	0.014	0.1	PASS
17	48.90E-3	0.021	0.1	PASS
18	18.22E-3	0.008	0.1	PASS
19	68.63E-3	0.030	0.1	PASS
20	26.57E-3	0.012	0.1	PASS
21	61.23E-3	0.027	0.1	PASS
22	15.92E-3	0.007	0.1	PASS
23	42.53E-3	0.018	0.1	PASS
24	25.14E-3	0.011	0.1	PASS
25	54.41E-3	0.024	0.1	PASS
26	23.95E-3	0.010	0.1	PASS
27	53.47E-3	0.023	0.1	PASS
28	21.87E-3	0.010	0.1	PASS
29	44.30E-3	0.019	0.1	PASS
30	22.05E-3	0.010	0.1	PASS
31	41.56E-3	0.018	0.1	PASS
32	20.14E-3	0.009	0.1	PASS
33	66.29E-3	0.029	0.1	PASS
34	27.06E-3	0.012	0.1	PASS
35	51.75E-3	0.022	0.1	PASS
36	27.32E-3	0.012	0.1	PASS
37	49.53E-3	0.022	0.1	PASS
38	34.99E-3	0.015	0.1	PASS
39	51.18E-3	0.022	0.1	PASS
40	62.20E-3	0.027	0.1	PASS

7. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

7.1Block Diagram of Test Setup



(EUT: Inverter)

7.2Measuring Standard

EN 61000-3-3:2008

7.3Operation Condition of EUT

Same as Section 4.4, except the test setup replaced as Section 7.1.

7.4Measuring Results

PASS.

Please see the attached pages.

Test Report

Report title:	FLICKER
Company Name:	EMTEK
Date of test:	13:20 10.Oct 2011
Tester:	GiGGS
Standard used:	EN/IEC 61000-3-3 Flicker
Short time (Pst):	10 min
Observation time:	10 min (1 Flicker measurement)
Flickermeter:	230V / 50Hz
Flicker Impedance:	Zref (IEC 60725)
E. U. T.:	Inverter
M/N:	APC3012E

Test Result	PASS

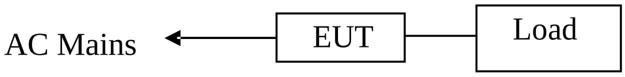
Maximum Flicker results

	EUT values	Limit	Result
Pst	0.28	1.00	PASS
dc [%]	0.903	3.30	PASS
dmax [%]	1.264	4.00	PASS
dt [s]	0.000	0.50	PASS

8. ELECTROSTATIC DISCHARGE IMMUNITY TEST

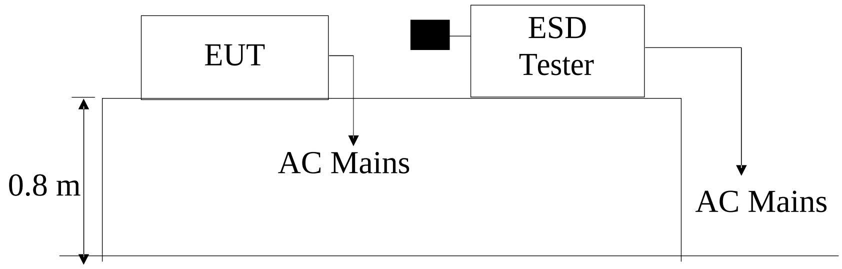
8.1 Block Diagram of Test Setup

8.1.1 Block diagram of connection between the EUT and simulators



(EUT: Inverter)

8.1.2 Block diagram of ESD test setup



(EUT: Inverter)

8.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-2: 2009
Severity Level: 3 / Air Discharge: ±8KV Level: 2 / Contact Discharge: ±4KV)

8.3 Severity Levels and Performance Criterion

8.3.1 Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	±2	±2
2.	±4	±4
3.	±6	±8
4.	±8	±15
X	Special	Special

8.3.2 Performance criterion: **B**

8.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

8.5 Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.4. Except the test set up replaced by Section 8.1.

8.6 Test Procedure

8.6.1 Air Discharge**:**

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

8.6.2 Contact Discharge**:**

All the procedure shall be same as Section 8.6.1. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

8.6.3 Indirect discharge for horizontal coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

8.6.4 Indirect discharge for vertical coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

8.7 Test Results

PASS

Please refer to the following pages

Electrostatic Discharge Test Result

SHENZHEN EMTEK CO., LTD

Applicant	: Tortech Pty Ltd	Test Date	:	October 10, 2011	
EUT	: Inverter	Temperature	:	22℃	
M/N	: APC3012E	Humidity	:	50%	
Power supply	: AC 230V/50Hz	Test Mode	:	Full Load	
Air discharge	: ＋8.0KV	Criterion	:	B	
Contact discharge:	＋4.0KV	Test Engineer :		Zone	

Location	**Kind** A-Air Discharge C-Contact Discharge	**Result**
Slot of the EUT	A	PASS
Button	A	PASS
Screw	C	PASS
Metal	C	PASS
HCP	C	PASS
VCP of front	C	PASS
VCP of rear	C	PASS
VCP of left	C	PASS
VCP of right	C	PASS

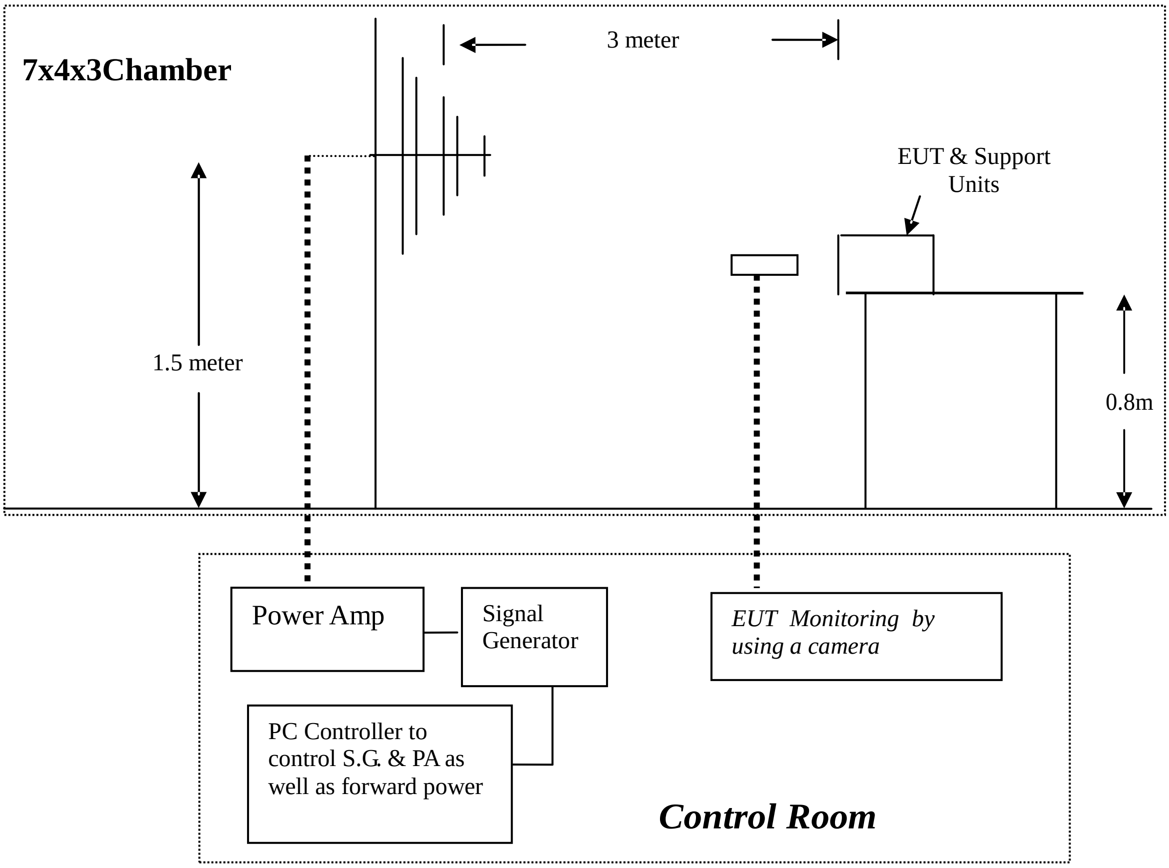
9. RF FIELD STRENGTH SUSCEPTIBILITY TEST

9.1 Block Diagram of Test

9.1.1 Block diagram of connection between the EUT and Load

(EUT: Inverter)

9.1.2 Block diagram of RS test setup



(EUT: Inverter)

9.2Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-3: 2006+A1:2008+A2:2010 (Severity Level: 2, 3V / m))

9.3 Severity Levels and Performance Criterion

9.3.1 Severity Levels

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

9.3.2 Performance Criterion : **A**

9.4 EUT Configuration on Test

The configuration of the EUT is same as Section 4.3.

9.5 Operating Condition of EUT

Same as radiated emission measurement, which is listed in Section 4.4, except the test setup replaced as Section 9.1.

9.6 Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.
In order to judge the EUT performance, a CCD camera is used to monitor its screen.
All the scanning conditions are as following:

Condition of Test	Remark
1. Fielded Strength	3V/m (Severity Level 2)
2. Radiated Signal	Modulated
3. Scanning Frequency	80-1000MHz
4. Sweep time of radiated	0.0015 Decade/s
5. Dwell Time	1 Sec.

9.7 Test Results

PASS.

Please refer to the following page.

RF Field Strength Susceptibility Test Results

SHENZHEN EMTEK CO., LTD.

Applicant	: Tortech Pty LTD	Test Date	: October 10, 2011
EUT	: Inverter	Temperature	: 22℃
M/N :	APC3012E	Humidity	: 50 ％
Field Strength :	3V/m	Criterion	: A
Power Supply :	AC 230V/50Hz	Test Mode	: Full Load
Test Engineer:	Zone	Frequency Range:	80 MHz to 1000 MHz

Modulation: ☐None ☐ Pulse ☒AM 1KHz 80%

	Frequency Rang 1: 80~ 1000MHz		Frequency Rang 2:	
Steps	# / %		# / %	
	Horizontal	Vertical	Horizontal	Vertical
Front	PASS	PASS		
Right	PASS	PASS		
Rear	PASS	PASS		
Left	PASS	PASS		

Test Equipment :
1. Signal Generator : 2023B (AEROFLEX)
2. Power Amplifier : AS0102-55(MILMEGA)&AP32MT215(PRANA)
3. Log.-Per.Antenna: VULP9118E(SCHWARZBECK)
4. Broad-Band Horn Antenna: BBHA 9120L3F(SCHWARZBECK)
5. RF Power Meter. Dual Channel: 4232A(BOONTON)
6. Field Strength Meter: HI-6005(HOLADAY)

Note:

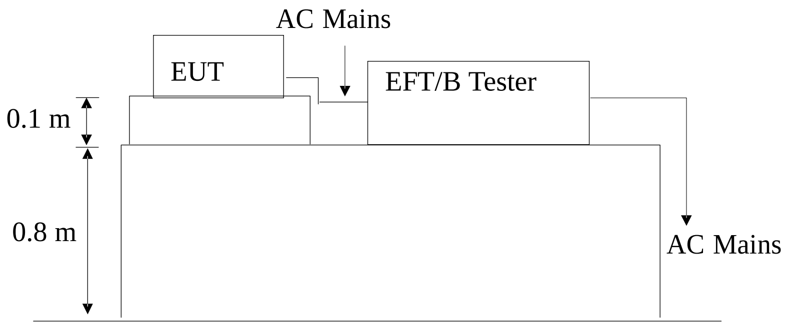
10. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

10.1 Block Diagram of Test Setup

10.1.1.Block Diagram of the EUT

(EUT: Inverter)

10.1.2.EFT Test Setup



10.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-4: 2004+A1:2010, Severity Level, Level 2**:** 1KV)

10.3 Severity Levels and Performance Criterion

10.3.1 Severity level

Open Circuit Output Test Voltage ±10％		
Level	On Inverter Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 KV	0.25 KV
2.	1 KV	0.5 KV
3.	2 KV	1 KV
4.	4 KV	2 KV
X	Special	Special

10.3.2 Performance criterion **: B**

10.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

10.5 Operating Condition of EUT

10.5.1 Setup the EUT as shown in Section 10.1.

10.5.2 Turn on the Inverter of all equipments.

10.5.3 Let the EUT work in test mode (Full Load) and measure it.

10.6 Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

10.6.1 For input and output AC Inverter ports**:**

The EUT is connected to the Inverter mains by using a coupling device, which couples the EFT interference signal to AC Inverter lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

10.6.2 For signal lines and control lines ports**:**

No I/O ports. It's unnecessary to test.

10.6.3 For DC output line ports**:**

It's unnecessary to test.

10.7 Test Result

PASS.

Please refer to the following page.

Electrical Fast Transient/Burst Test Results

SHENZHEN EMTEK CO., LTD.

Standard	☐ IEC 61000-4-4 ☒ EN 61000-4-4	Result: ☒ PASS / ☐ FAIL

Applicant : Tortech Pty Ltd

EUT : Inverter M/N : APC3012E

Input Voltage: AC 230 V 50 HZ

Criterion : B

Ambient Condition : 22 ℃ 50% RH

Operation Mode: Charging

Line : ☒ AC Mains	Line : ☐ Signal ☐ I/O Cable
Coupling : ☒ Direct	Coupling : ☐ Capacitive
Test Time : 120s	

Line	Test Voltage	Result (+)	Result (-)
L	1KV	PASS	PASS
N	1KV	PASS	PASS
PE	1KV	PASS	PASS
L、N	1KV	PASS	PASS
L、PE	1KV	PASS	PASS
N、PE	1KV	PASS	PASS
L、N、PE	1KV	PASS	PASS
Signal Line			
DC Line			

Note:

Test Equipment	Burst Tester Model: PEFT 4010

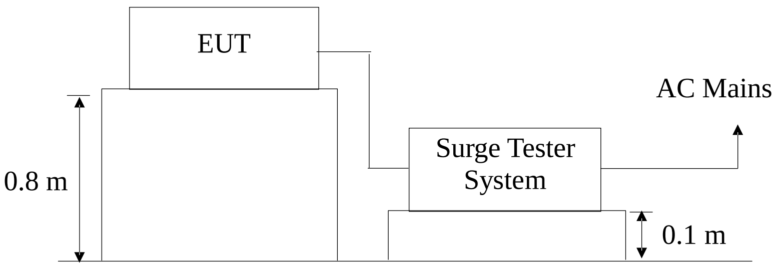
11. SURGE IMMUNITY TEST

11.1 Block Diagram of Test Setup

11.1.1 Block Diagram of the EUT

(EUT: Inverter)

11.1.2. Surge Test Setup



11.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-5: 2006)
Severity Level**:** Line to Line: Level 2, 1.0KV, Level 3**:** 2KV

11.3 Severity Levels and Performance Criterion

11.3.1.Severity level

Severity Level	Open-Circuit Test Voltage KV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

11.3.2 Performance criterion: **B**

11.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

11.5 Operating Condition of EUT

11.5.1 Setup the EUT as shown in Section 11.1.

11.5.2. Turn on the Inverter of all equipments.

11.5.3.Let the EUT work in test mode (Full Load) and measure it.

11.6 Test Procedure

1) Set up the EUT and test generator as shown on Section 11.1.2.
2) For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge
 For line to earth coupling mode, provide a 2.0 kV 1.2/50us voltage surge.
 (at open-circuit condition) and 8/20us current surge to EUT selected points.
3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
4) Different phase angles are done individually.
5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

11.7 Test Result

PASS.

Please refer to the following page.

Surge Immunity Test Result

SHENZHEN EMTEK CO., LTD.

Applicant: Tortech Pty Ltd	Test Date : October 10, 2011
EUT : Inverter	Temperature : 22℃
M/N : APC3012E	Humidity : 50%
Power Supply: AC 230V / 50Hz	Test Mode : Full Load
Test Engineer: Zone	Criterion : B

Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (KV)	Result
L-N	+	0^o	5	1.0	PASS
	+	90^o	5	1.0	PASS
	+	180^o	5	1.0	PASS
	+	270^o	5	1.0	PASS
	-	0^o	5	1.0	PASS
	-	90^o	5	1.0	PASS
	-	180^o	5	1.0	PASS
	-	270^o	5	1.0	PASS
L-PE	+	0^o	5	2.0	PASS
	+	90^o	5	2.0	PASS
	+	180^o	5	2.0	PASS
	+	270^o	5	2.0	PASS
	-	0^o	5	2.0	PASS
	-	90^o	5	2.0	PASS
	-	180^o	5	2.0	PASS
	-	270^o	5	2.0	PASS
N-PE	+	0^o	5	2.0	PASS
	+	90^o	5	2.0	PASS
	+	180^o	5	2.0	PASS
	+	270^o	5	2.0	PASS
	-	0^o	5	2.0	PASS
	-	90^o	5	2.0	PASS
	-	180^o	5	2.0	PASS
	-	270^o	5	2.0	PASS
Remark:					

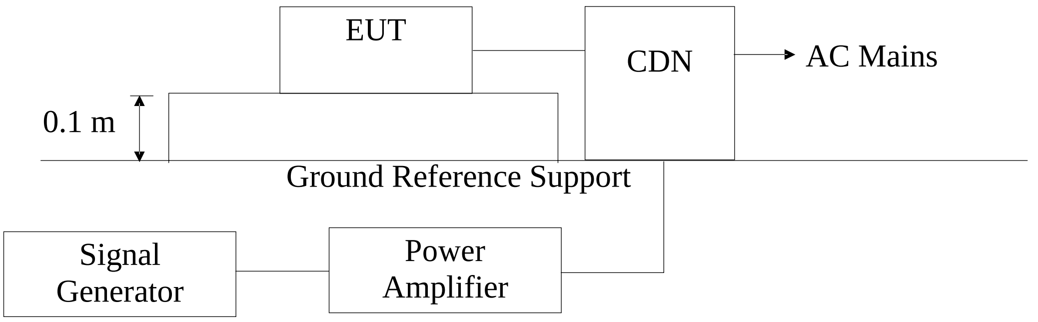
12. INJECTED CURRENTS SUSCEPTIBILITY TEST

12.1 Block Diagram of Test Setup

12.1.1 Block Diagram of the EUT

(EUT: Inverter)

12.1.2 Block Diagram of Test Setup



12.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003 (EN61000-4-6: 2009, Severity Level: Level 2, 3V (rms), (0.15MHz ~ 80MHz)

12.3 Severity Levels and Performance Criterion

12.3.1 Severity level

Level	Field Strength V
1	1
2	3
3	10
X	Special

12.3.2 Performance criterion**: A**

12.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

11.5 Operating Condition of EUT

11.5.1 Setup the EUT as shown in Section 12.1.

11.5.2 Turn on the Inverter of all equipments.

11.5.3 Let the EUT work in test mode (Full Load) and measure it.

12.6 Test Procedure

1) Set up the EUT, CDN and test generators as shown on Section 12.1.2.
2) Let the EUT work in test mode and measure it.
3) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
4) The disturbance signal described below is injected to EUT through CDN.
5) The EUT operates within its operational mode(s) under intended climatic conditions after Inverter on.
6) The frequency range is swept from 150KHz to80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
7) The rate of sweep shall not exceed $1.5*10^{-3}$decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

12.7Test Results

PASS.

Please refer to the following page.

Injected Currents Susceptibility Test Results

SHENZHEN EMTEK CO., LTD.

Applicant : Tortech Pty Ltd EUT : Inverter M/N : APC3012E Power Supply : AC 230V / 50Hz Test Engineer : Zone	Test Date: October 10, 2011 Temperature : 22℃ Humidity : 50%

Test Mode : Full Load

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
0.15 ~ 80	AC Mains	3V	A	PASS

Test Mode:

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result

Remark : 1. Modulation Signal:1KHz 80% AM Measurement Equipment : Simulator: CWS 500 (SWITZERLAND EMTEST) CDN : ☐ CDN-M2 (SWITZERLAND EMTEST) ☒ CDN-M3 (SWITZERLAND EMTEST)	Note:

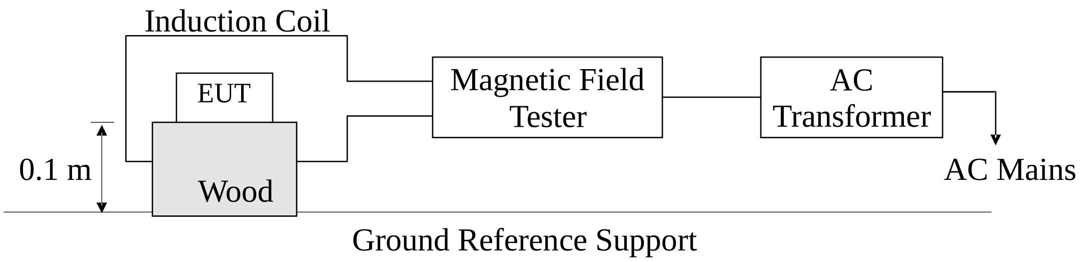
13. MAGNETIC FIELD SUSCEPTIBILITY TEST

13.1 Block Diagram of Test

13.1.1 Block diagram of test setup

(EUT: Inverter)

13.1.2 Magnetic field test setup



(EUT: Inverter)

13.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003 (EN61000-4-8: 2010, Severity Level: Level 1, 1A / m)

13.3 Severity Levels and Performance Criterion

13.3.1 Severity Levels

Level	Field Strength A/m
1	1
2	3
3	10
4	30
5	100
X	Special

13.3.2 Performance Criterion: **A**

13.4 EUT Configuration on Test

The configuration of the EUT is same as Section 4.3.

13.5 Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. The X, Y and Z polarization of the induction coil is set on test, so that each side of the EUT is affected by the magnetic field. Also can reach the same aim by change the position of the EUT.

13.6Test Results

PASS.

Please refer to the following page.

Magnetic Field Immunity Test Result

SHENZHEN EMTEK CO., LTD.

Standard	☐ IEC 61000-4-8 ☒ EN 61000-4-8	Result: ☒ Pass / ☐ Fail

EUT : Inverter M/N: APC3012E

Input Voltage : 230V 50Hz

Date of Test : October 10, 2011 Test Engineer: Zone

Ambient Condition : Temp : 22℃ Humid: 50%

Criterion : A

Operation Mode : Full Load

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result
1	5 mins	X		
1	5 mins	Y	A	PASS
1	5 mins	Z	A	PASS
Operation Mode :			A	PASS

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result

Test Equipment	Magnetic Field Test : HEAFELY MAG 100.1

Note:

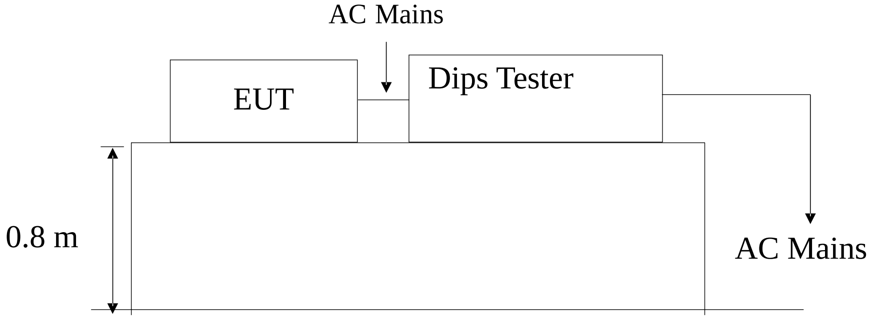
14. VOLTAGE DIPS AND INTERRUPTIONS TEST

14.1 Block Diagram of Test Setup

14.1.1 Block Diagram of the EUT

(EUT: Inverter)

14.1.2 Dips Test Setup



14.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-11: 2004)

14.3 Severity Levels and Performance Criterion

14.3.1 Severity level

Test Level %UT	Voltage dip and short interruptions %UT	Duration (in period)
0	100	0.5 1 5 10 25 50 *
40	60	
70	30	

14.3.2 Performance criterion: **B&C**

14.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

14.5 Operating Condition of EUT

14.5.1 Setup the EUT as shown in Section 14.1.

14.5.2 Turn on the Inverter of all equipments.

14.5.3 Let the EUT work in test mode (Full Load) and measure it.

14.6 Test Procedure

1) Set up the EUT and test generator as shown on Section 14.1.2.
2) The interruption is introduced at selected phase angles with specified duration.
3) Record any degradation of performance.

14.7 Test Result

PASS.

Please refer to the following page.

Voltage Dips And Interruptions Test Results

SHENZHEN EMTEK CO., LTD.

EUT : Inverter M/N : APC3012E Power Supply : 230V / 50Hz	Test Date : October 10, 2011 Temperature : 22℃ Humidity : 50% Test Engineer : Zone

Test Mode: Full Load

Test Level % U_T	Voltage Dips & Short Interruptions % U_T	Duration (in periods)	Criterion ☐ A ☒ B ☒ C ☐ D	Result P=PASS F=Fail
0	100	0.5P	B	P
70	30	25P	C	P
0	100	250P	C	P

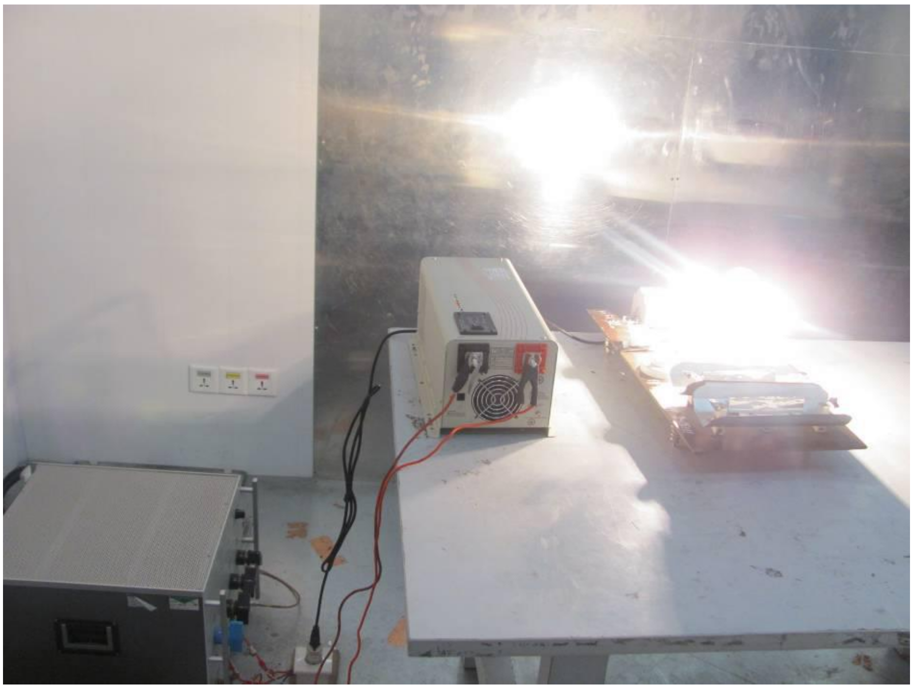
Test Mode :

Test Level % U_T	Voltage Dips & Short Interruptions % U_T	Duration (in periods)	Criterion ☐ A ☐ B ☐ C ☐ D	Result P=PASS F=FAIL

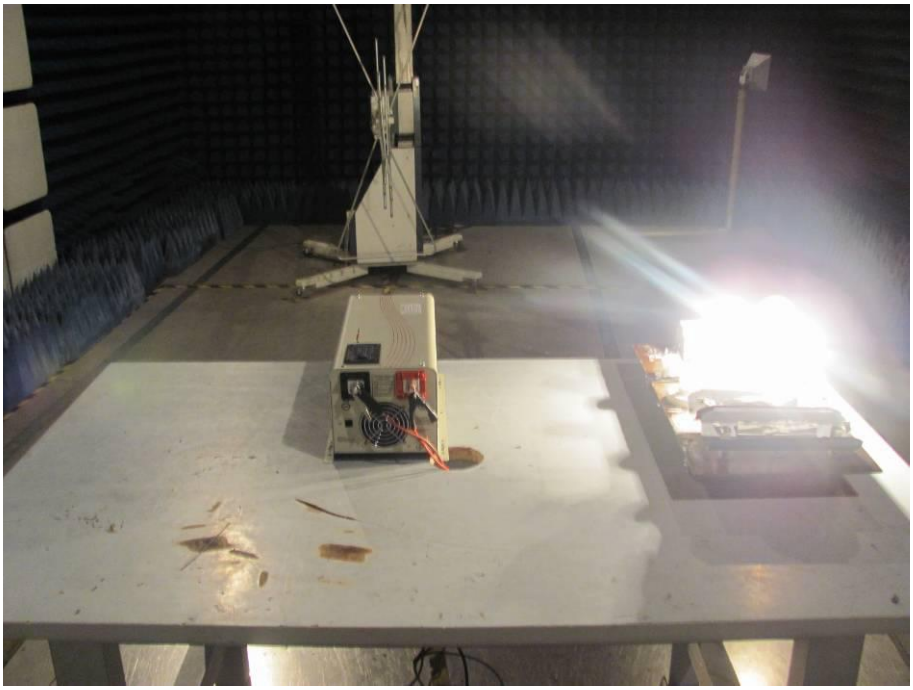
Note:

15. PHOTOGRAPH

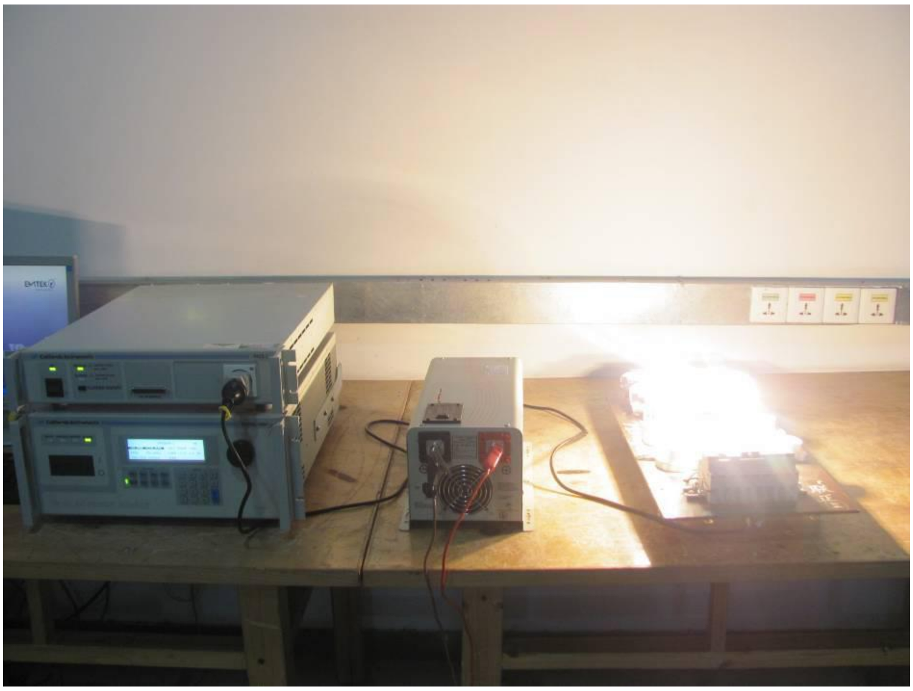
15.1 Photo of Conducted Emission Measurement



15.2 Photo of Radiation Emission Measurement

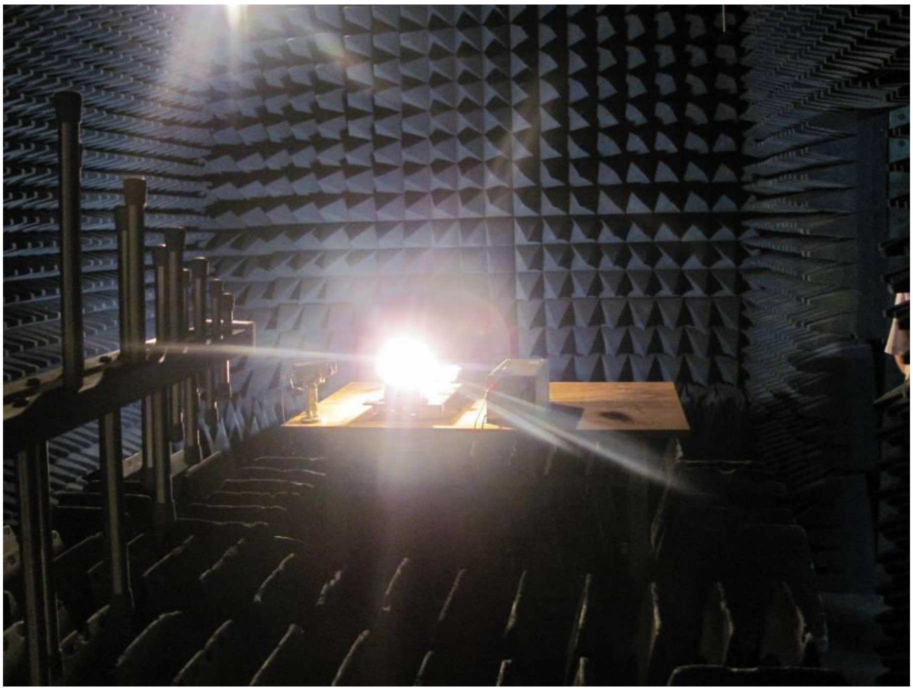


15.3 Photos of Harmonic / Flicker Measurement

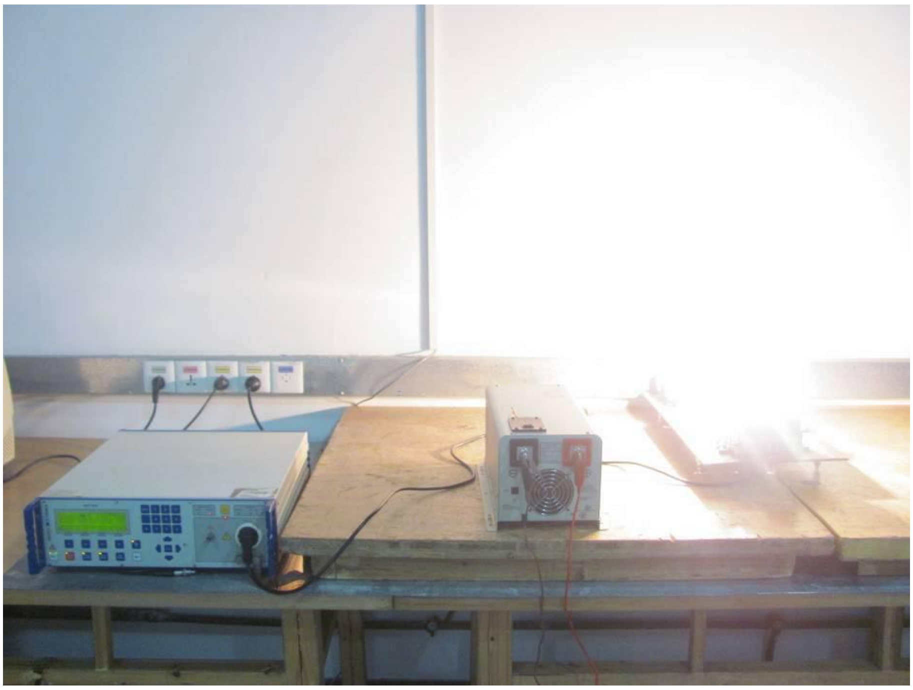


15.4 Photos of Electrostatic Discharge Test

15.5 Photos of RF Field Strength susceptibility Test

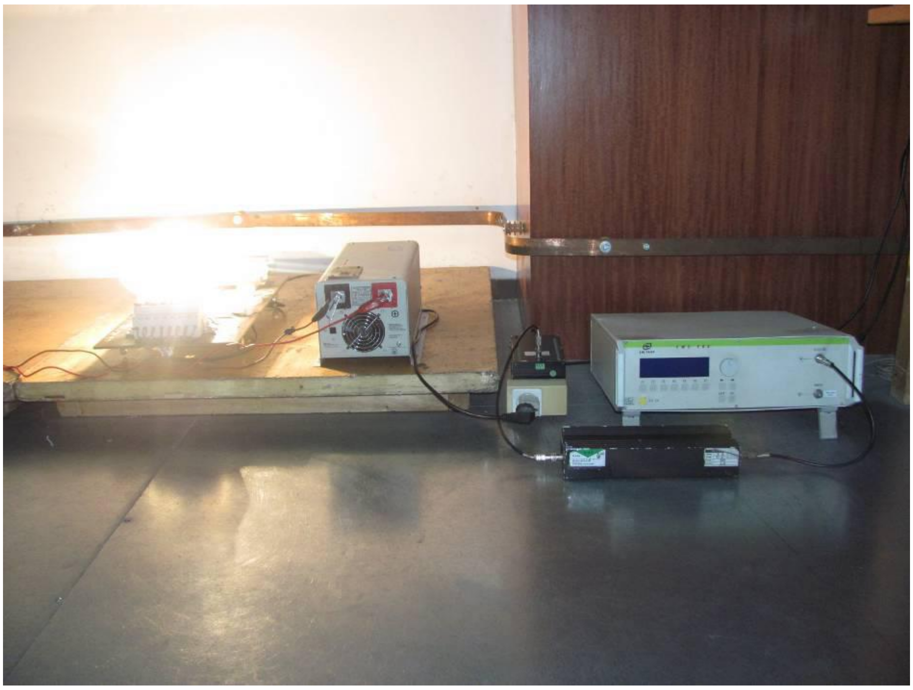


15.6 Photo of Electrical Fast Transient /Burst Test

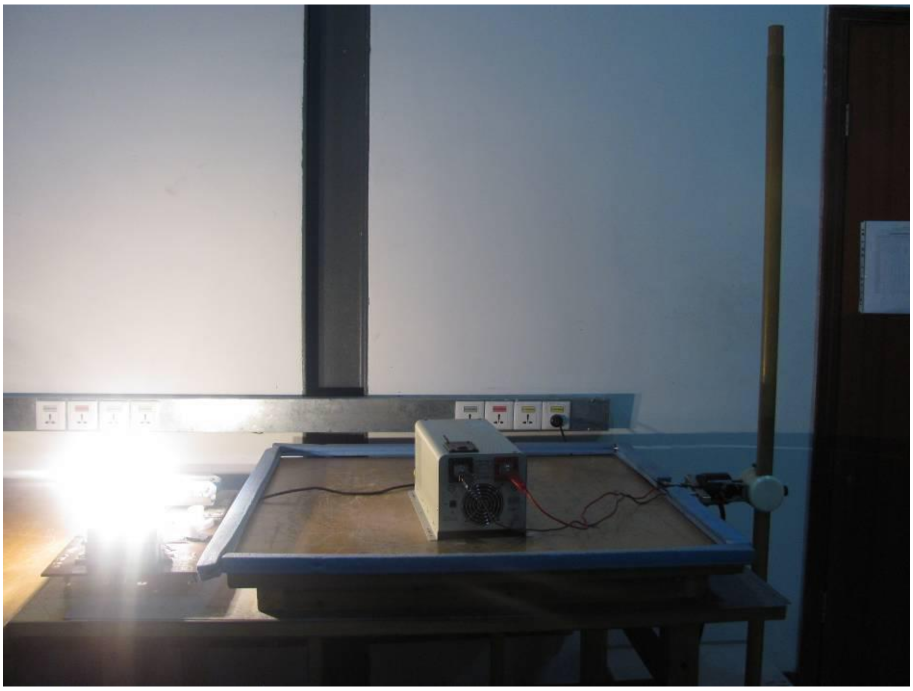


15.7 Photo of Surge Test

15.8 Photo of Injected Currents Susceptibility Test

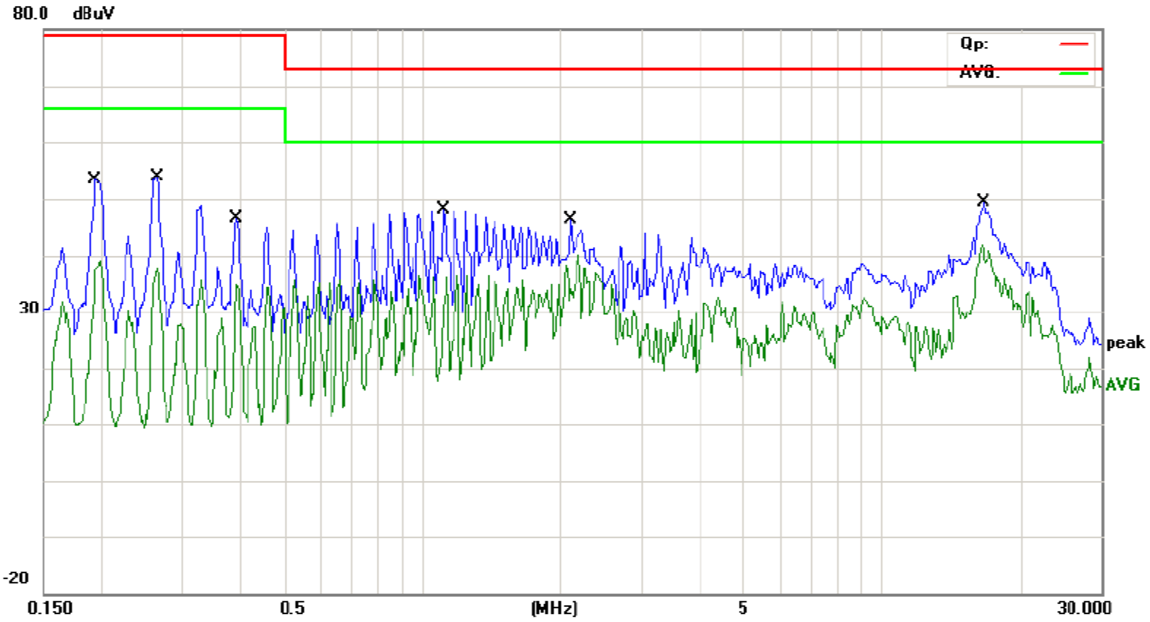


15.9 Photo of Magnetic Field Immunity Test



15.10 Photo of Voltage Dips and Interruption Immunity Test

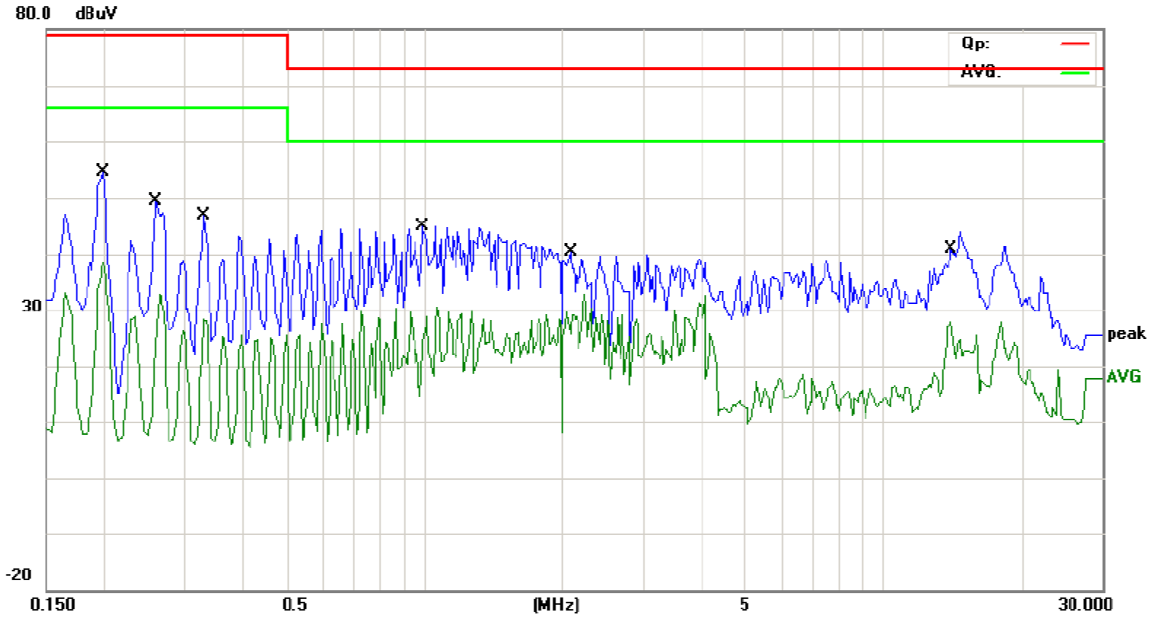
APPENDIX I



Site Conduction #2 | Phase: L1 | Temperature: 26
Limit: (CE)EN55022 class A_QP | Power: AC 230V/50Hz | Humidity: 60 %
Mode: FULL LOAD
Note: LINE MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1950	53.50	0.00	53.50	79.00	-25.50	QP	
2		0.1950	39.10	0.00	39.10	66.00	-26.90	AVG	
3		0.2650	53.91	0.00	53.91	79.00	-25.09	QP	
4		0.2650	37.72	0.00	37.72	66.00	-28.28	AVG	
5		0.3950	46.68	0.00	46.68	79.00	-32.32	QP	
6		0.3950	35.54	0.00	35.54	66.00	-30.46	AVG	
7		1.1150	48.05	0.00	48.05	73.00	-24.95	QP	
8		1.1150	36.44	0.00	36.44	60.00	-23.56	AVG	
9		2.1000	46.33	0.00	46.33	73.00	-26.67	QP	
10		2.1000	40.08	0.00	40.08	60.00	-19.92	AVG	
11		16.5000	49.34	0.00	49.34	73.00	-23.66	QP	
12	*	16.5000	41.96	0.00	41.96	60.00	-18.04	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: kl



Site Conduction #2 Phase: N Temperature: 26

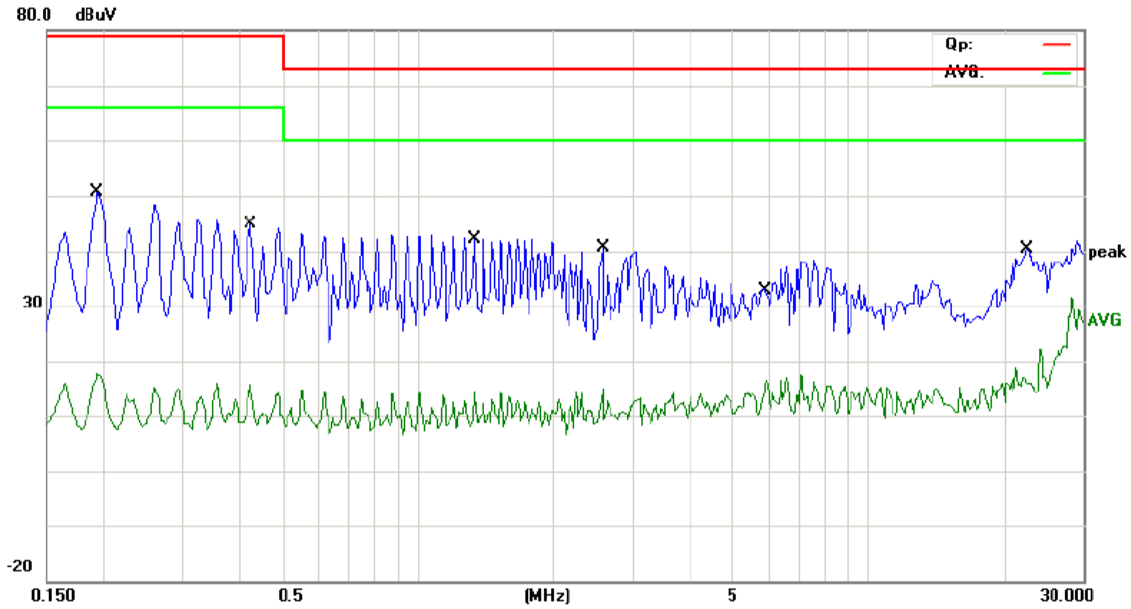
Limit: (CE)EN55022 class A_QP Power: AC 230V/50Hz Humidity: 60 %

Mode: FULL LOAD

Note: LINE MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.2000	54.61	0.00	54.61	79.00	-24.39	QP	
2		0.2000	38.56	0.00	38.56	66.00	-27.44	AVG	
3		0.2600	49.32	0.00	49.32	79.00	-29.68	QP	
4		0.2600	32.94	0.00	32.94	66.00	-33.06	AVG	
5		0.3300	46.78	0.00	46.78	79.00	-32.22	QP	
6		0.3300	28.29	0.00	28.29	66.00	-37.71	AVG	
7		0.9900	45.00	0.00	45.00	73.00	-28.00	QP	
8		0.9900	30.56	0.00	30.56	60.00	-29.44	AVG	
9		2.0800	40.38	0.00	40.38	73.00	-32.62	QP	
10		2.0800	32.80	0.00	32.80	60.00	-27.20	AVG	
11		14.1000	43.78	0.00	43.78	73.00	-29.22	QP	
12		14.1000	27.91	0.00	27.91	60.00	-32.09	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: kl

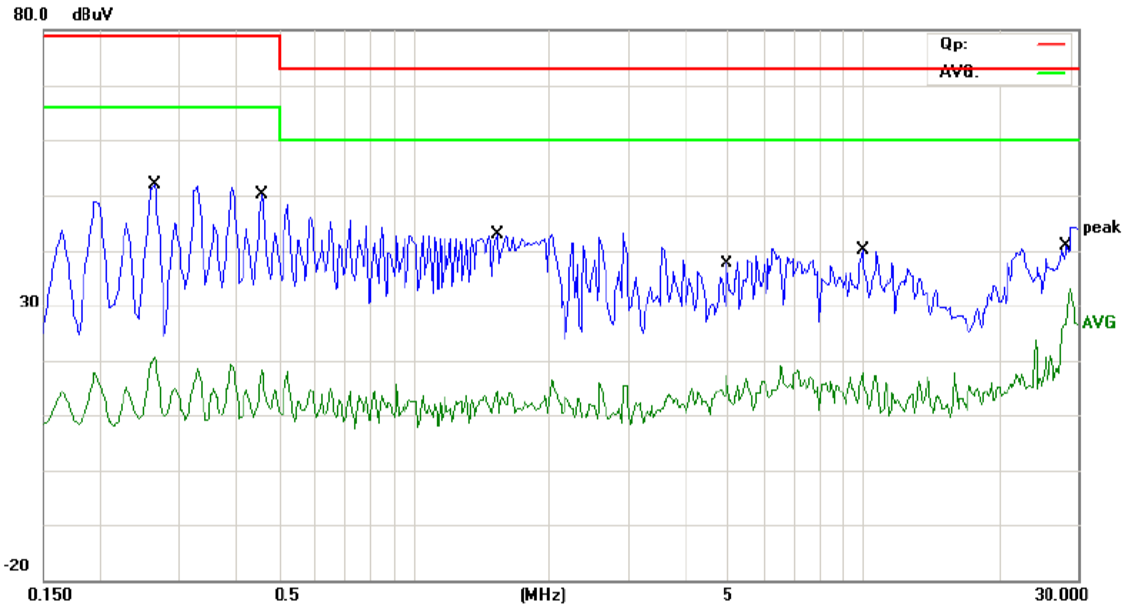


Site Conduction #2 | Phase: L1 | Temperature: 26
Limit: (CE)EN55022 class A_QP | Power: AC 230V/50Hz | Humidity: 60 %

Mode: FULL LOAD
Note: BAT MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.1950	50.74	0.00	50.74	79.00	-28.26	QP	
2		0.1950	17.85	0.00	17.85	66.00	-48.15	AVG	
3		0.4250	44.09	0.00	44.09	79.00	-34.91	QP	
4		0.4250	15.90	0.00	15.90	66.00	-50.10	AVG	
5		1.3350	42.12	0.00	42.12	73.00	-30.88	QP	
6		1.3350	14.60	0.00	14.60	60.00	-45.40	AVG	
7		2.5800	37.22	0.00	37.22	73.00	-35.78	QP	
8		2.5800	15.19	0.00	15.19	60.00	-44.81	AVG	
9		5.9400	38.46	0.00	38.46	73.00	-34.54	QP	
10		5.9400	16.73	0.00	16.73	60.00	-43.27	AVG	
11		22.5750	40.41	0.00	40.41	73.00	-32.59	QP	
12		22.5750	22.89	0.00	22.89	60.00	-37.11	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: kl



Site Conduction #2 Phase: N Temperature: 26

Limit: (CE)EN55022 class A_QP Power: AC 230V/50Hz Humidity: 60 %

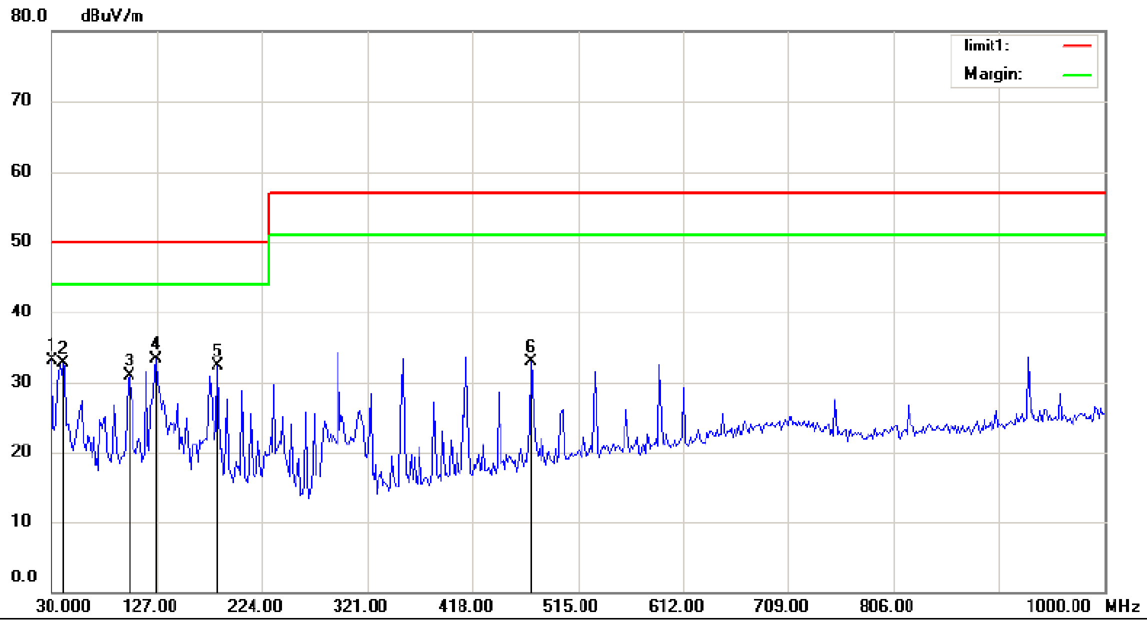
Mode: FULL LOAD

Note: BAT MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.2650	51.89	0.00	51.89	79.00	-27.11	QP	
2		0.2650	20.55	0.00	20.55	66.00	-45.45	AVG	
3		0.4600	46.10	0.00	46.10	79.00	-32.90	QP	
4		0.4600	18.32	0.00	18.32	66.00	-47.68	AVG	
5		1.5400	42.88	0.00	42.88	73.00	-30.12	QP	
6		1.5400	16.52	0.00	16.52	60.00	-43.48	AVG	
7		4.9600	43.10	0.00	43.10	73.00	-29.90	QP	
8		4.9600	17.43	0.00	17.43	60.00	-42.57	AVG	
9		9.9700	40.18	0.00	40.18	73.00	-32.82	QP	
10		9.9700	17.99	0.00	17.99	60.00	-42.01	AVG	
11		28.3500	44.21	0.00	44.21	73.00	-28.79	QP	
12		28.3500	27.09	0.00	27.09	60.00	-32.91	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: kl

APPENDIX II



Site site #1 | Polarization: *Vertical* | Temperature: 26

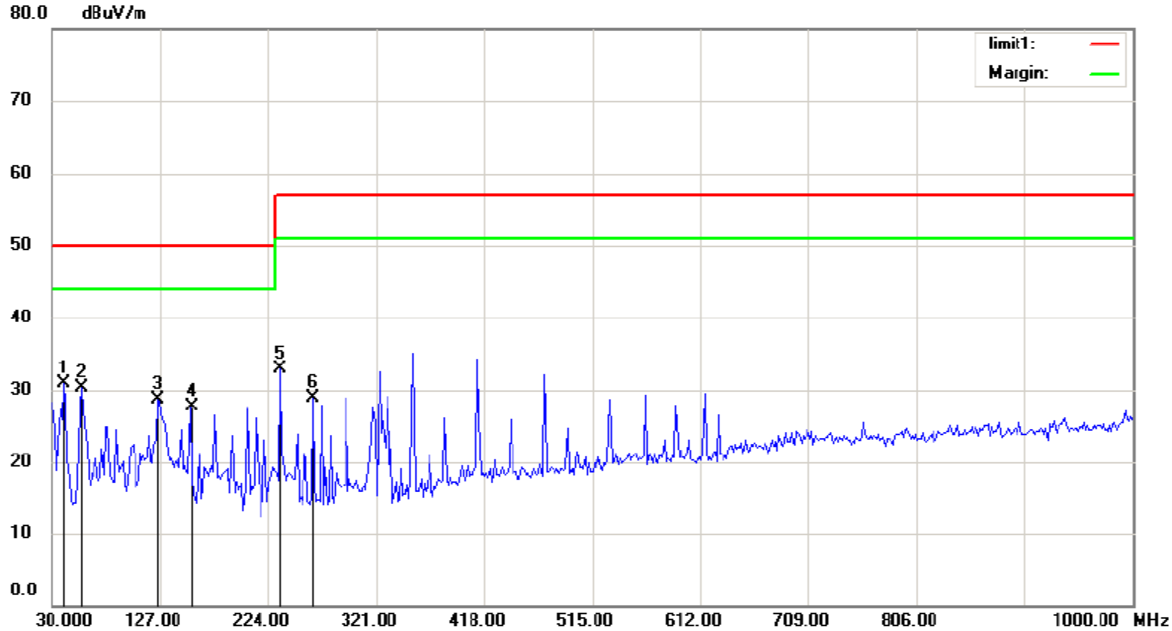
Limit: (RE)EN55022 class A | Power: AC 230V/50Hz | Humidity: 60 %

Mode:FULL LOAD

Note: LINE MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		30.0000	19.21	13.93	33.14	50.00	-16.86	QP			
2		40.8813	18.57	14.12	32.69	50.00	-17.31	QP			
3		101.5062	17.36	13.58	30.94	50.00	-19.06	QP			
4	*	126.3782	22.25	11.11	33.36	50.00	-16.64	QP			
5		183.8942	20.74	11.52	32.26	50.00	-17.74	QP			
6		471.4743	14.71	18.29	33.00	57.00	-24.00	QP			

*:Maximum data x:Over limit !:over margin Operator: KL



Site site #1 Polarization: *Horizontal* Temperature: 26

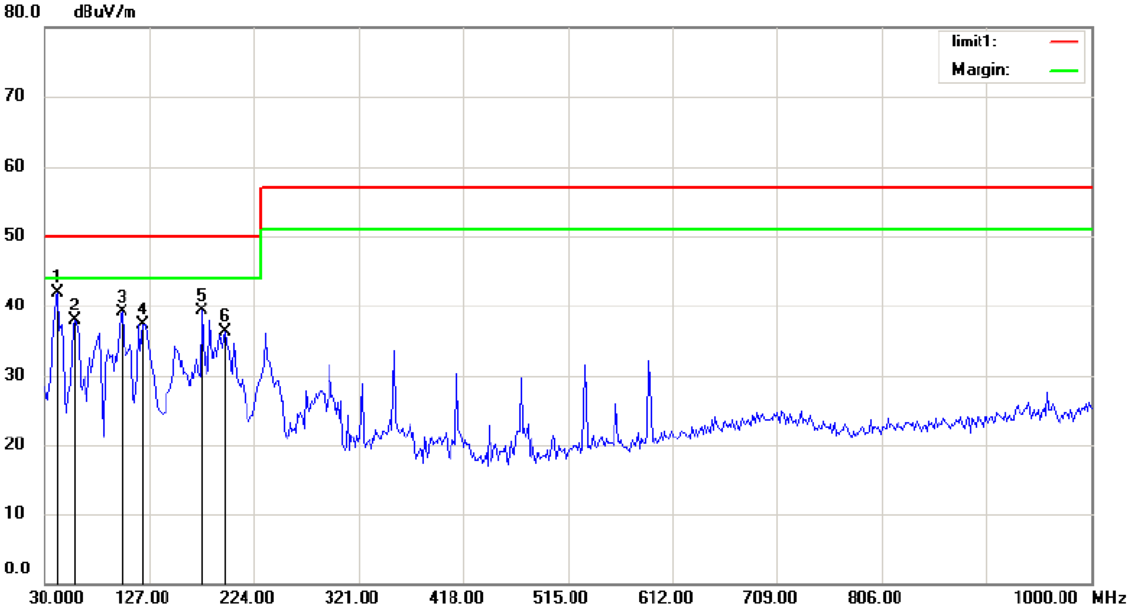
Limit: (RE)EN55022 class A Power: AC 230V/50Hz Humidity: 60 %

Mode:FULL LOAD

Note: LINE MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	40.8813	16.67	14.26	30.93	50.00	-19.07	QP			
2		56.4262	16.91	13.37	30.28	50.00	-19.72	QP			
3		124.8237	18.13	10.54	28.67	50.00	-21.33	QP			
4		154.3590	18.50	9.13	27.63	50.00	-22.37	QP			
5		235.1922	20.11	12.84	32.95	57.00	-24.05	QP			
6		264.7275	14.73	14.10	28.83	57.00	-28.17	QP			

*:Maximum data x:Over limit !:over margin Operator: KL



Site site #1 Polarization: *Vertical* Temperature: 26

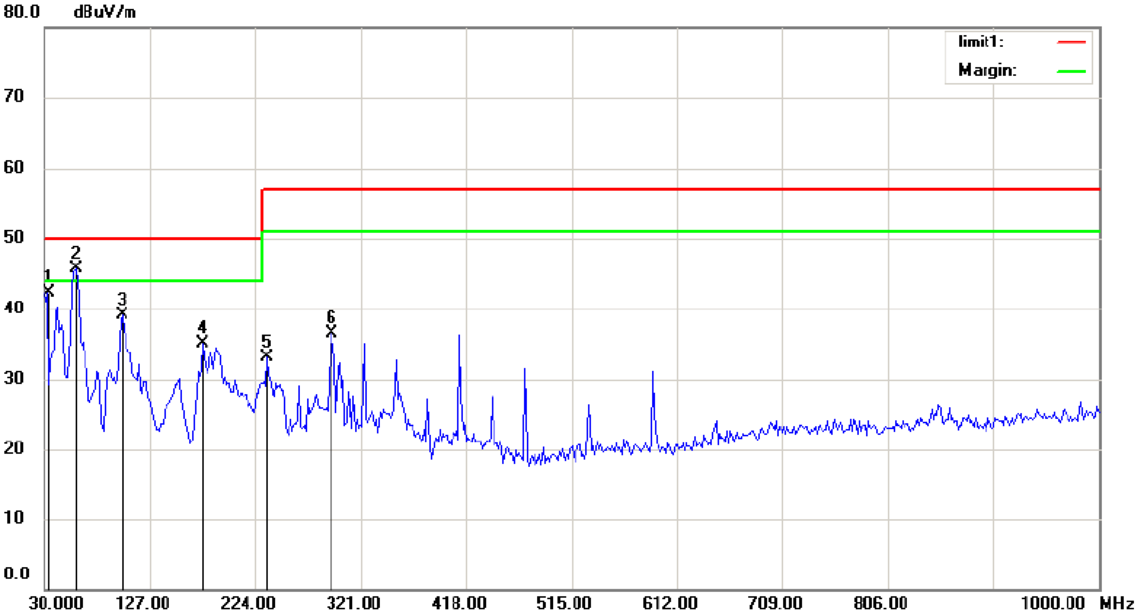
Limit: (RE)EN55022 class A Power: AC 230V/50Hz Humidity: 60 %

Mode:FULL LOAD

Note: BAT MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	42.4358	27.76	14.14	41.90	50.00	-8.10	QP			
2		57.9806	24.54	13.27	37.81	50.00	-12.19	QP			
3		101.5062	25.45	13.58	39.03	50.00	-10.97	QP			
4		121.7146	25.13	12.24	37.37	50.00	-12.63	QP			
5		176.1217	29.00	10.28	39.28	50.00	-10.72	QP			
6		197.8846	22.82	13.46	36.28	50.00	-13.72	QP			

*:Maximum data x:Over limit !:over margin Operator: KL



Site site #1 | Polarization: **Horizontal** | Temperature: 26

Limit: (RE)EN55022 class A | Power: AC 230V/50Hz | Humidity: 60 %

Mode:FULL LOAD

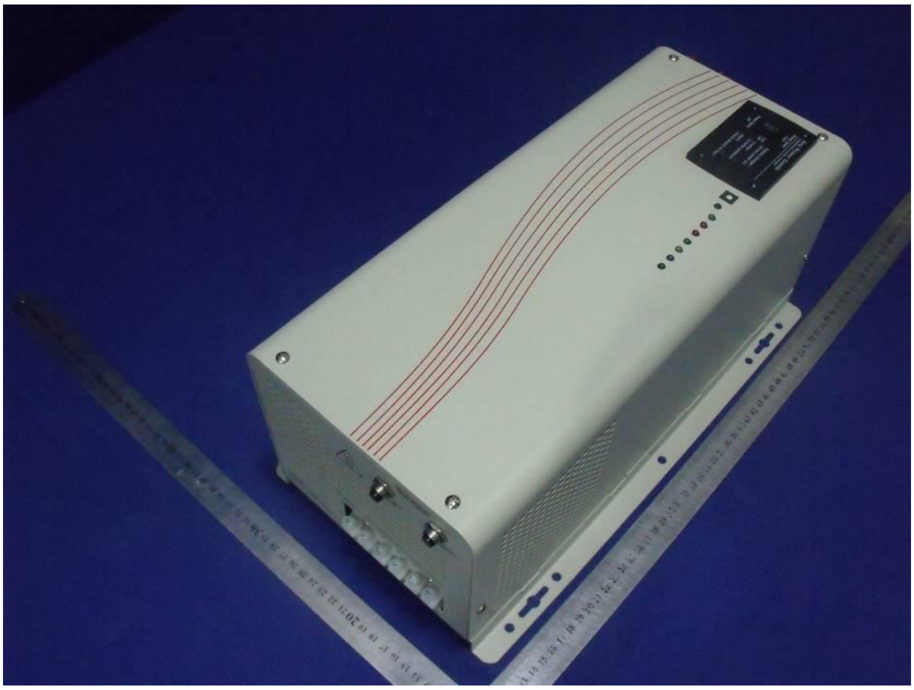
Note: BAT MODE

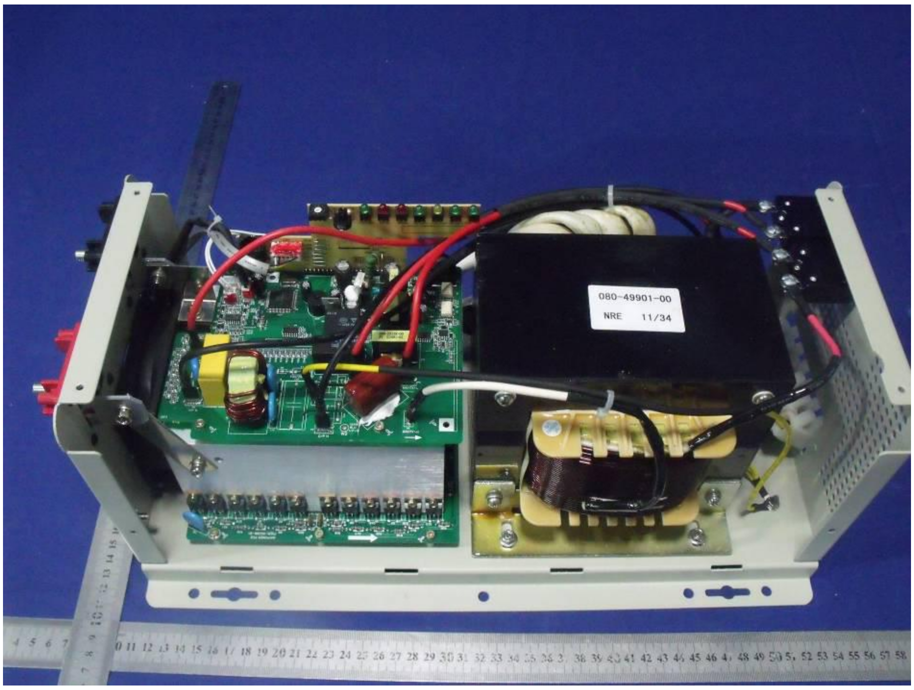
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		33.1090	28.25	14.13	42.38	50.00	-7.62	QP			
2	*	59.5352	32.50	13.19	45.69	50.00	-4.31	QP			
3		101.5062	25.64	13.53	39.17	50.00	-10.83	QP			
4		176.1217	24.95	10.09	35.04	50.00	-14.96	QP			
5		235.1922	20.33	12.84	33.17	57.00	-23.83	QP			
6		294.2628	22.53	13.95	36.48	57.00	-20.52	QP			

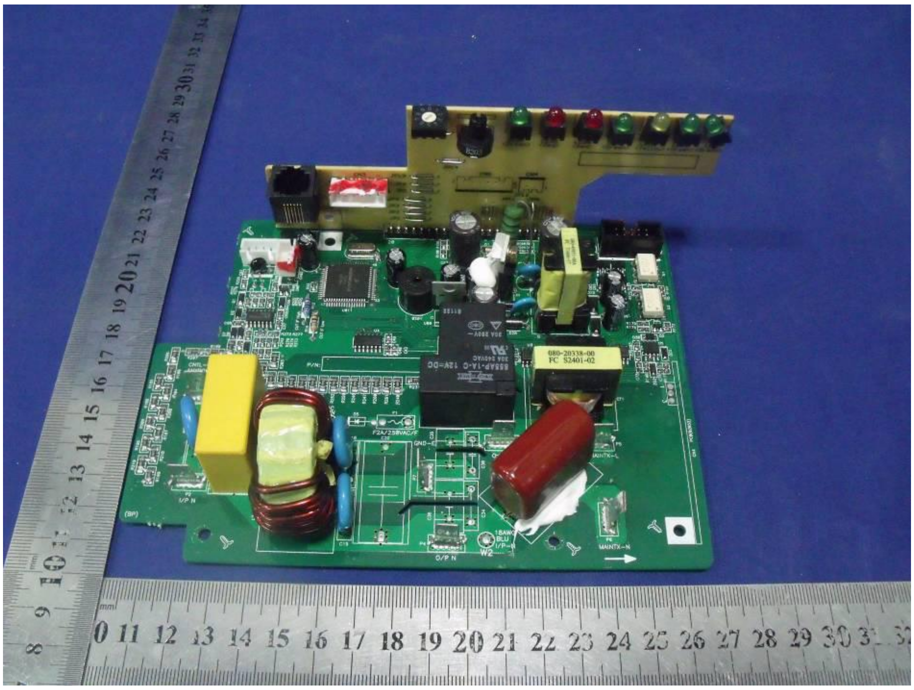
*:Maximum data x:Over limit !:over margin Operator: KL

APPENDIX III
(PHOTOS OF EUT)

FIGURE 1
GENERAL APPEARANCE OF EUT




080-49901-00
NRE 11/34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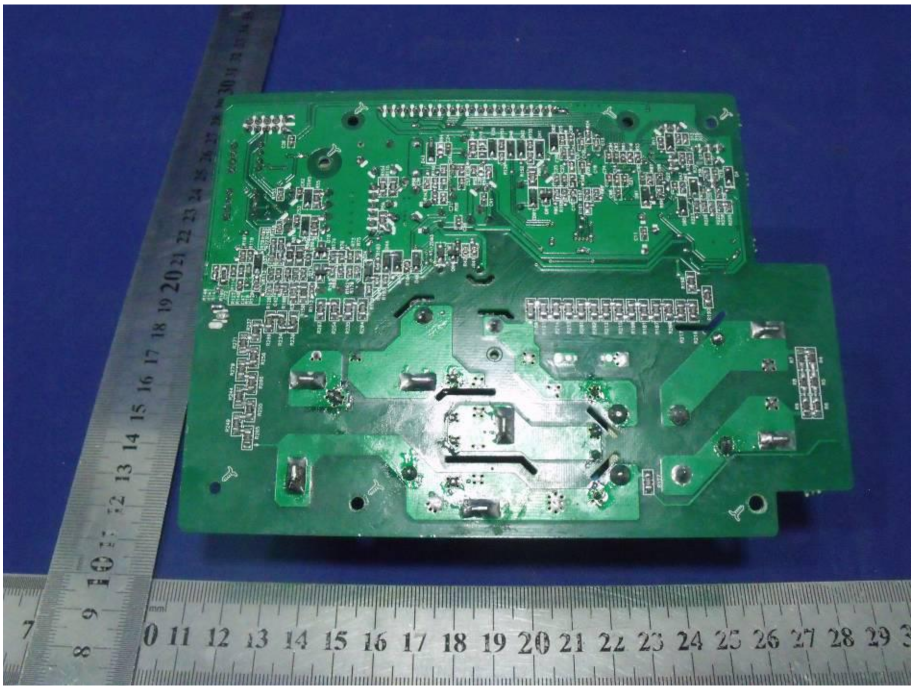
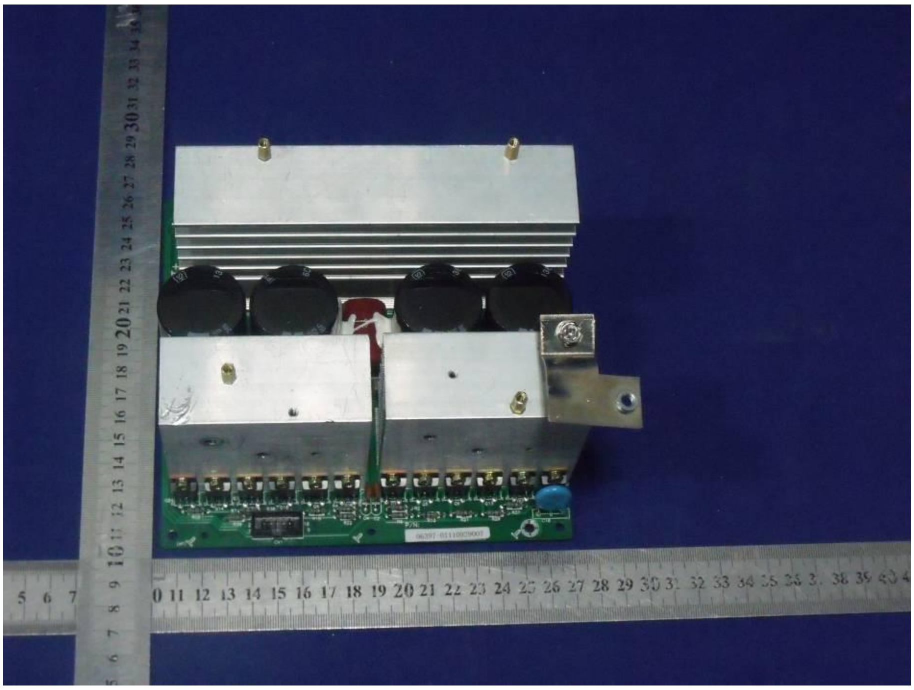
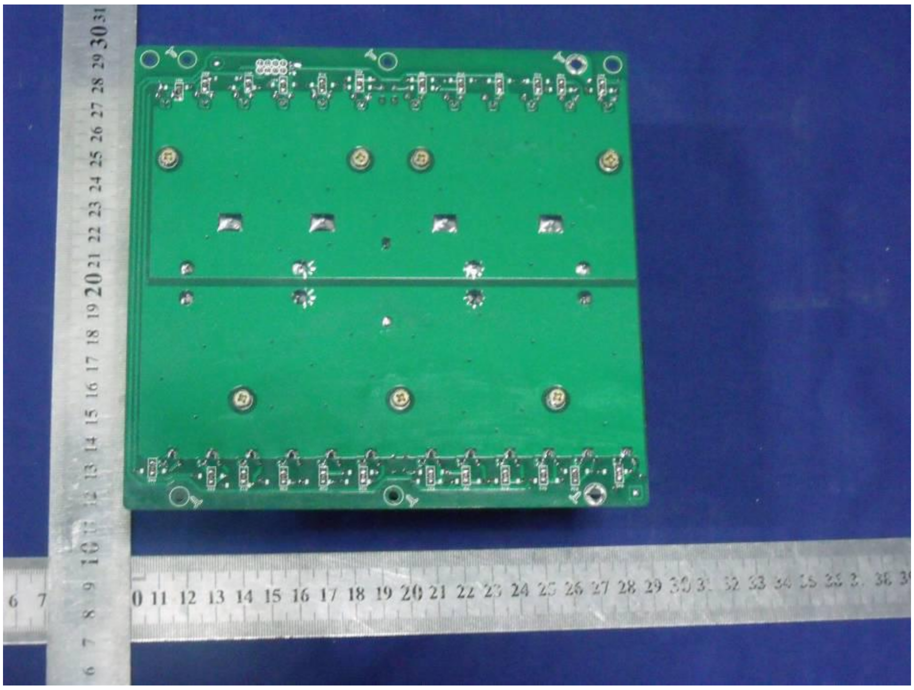
FC S2401-02







EMC TEST REPORT
for
Tortech Pty Ltd

Inverter
Model No.: APC1024E, APC1524E, APC2024E, APC3024E, APC4024E, APC5024E, APC6024E

Prepared by	:	Shenzhen EMTEK Co., Ltd
Address	:	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China
		Tel: (0755) 26954280 Fax: (0755) 26954282

Report Number	:	ES111008006E
Date of Test	:	October 08, 2011 to October 15, 2011
Date of Report	:	October 15, 2011

TABLE OF CONTENT

TEST REPORT DESCRIPTION

Applicant	:	Tortech Pty Ltd
Trade Mark	:	EYEN
EUT	:	Inverter
Model No.	:	APC1024E, APC1524E, APC2024E, APC3024E, APC4024E, APC5024E, APC6024E

Measurement Procedure Used:
EN55022: 2006+A1:2007,
EN 61000-3-2:2006+A1:2009+A2:2009
EN 61000-3-3:2008
EN55024: 1998+A1: 2001+A2: 2003
(EN61000-4-2: 2009, EN61000-4-3: 2006+A1:2008+A2:2010, EN61000-4-4: 2004+A1:2010, EN61000-4-5: 2006, EN61000-4-6: 2009, EN61000-4-8: 2010, EN61000-4-11: 2004)

The device described above is tested by SHENZHEN EMTEK CO., LTD. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and SHENZHEN EMTEK CO., LTD. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN55022, EN61000-3-2, EN61000-3-3 and EN55024 requirements.
This report applies to above tested sample only and shall not be reproduced in part without written approval of SHENZHEN EMTEK CO., LTD.

Date of Test	:	October 08, 2011 to October 15, 2011
Prepared by	:	(Engineer)
Reviewer	:	(Project Manager)
Approved & Authorized Signer:		(Manager)

SHENZHEN EMTEK CO., LTD. TESTING

1. SUMMARY OF TEST RESULT

EMISSION			
Description of test item	Standard	Limits	Results
Conducted disturbance at mains terminals	EN55022: 2006+A1: 2007	Class A	Pass
Radiated Disturbance	EN55022: 2006+A1: 2007	Class A	Pass
Harmonic current emissions	EN61000-3-2:2006+A1: 2009+A2:2009	Class A	Pass
Voltage fluctuation and flicker	EN61000-3-3:1995+A1: 2001+A2:2005	Section 5	Pass
Immunity			
Description of test item	Basic Standard	Performance Criteria	Results
Electrostatic Discharge (ESD)	EN61000-4-2: 2009	B	Pass
Radio-frequency, Continuous radiated disturbance	EN61000-4-3: 2006+A1:2008+A2:2010	A	Pass
EFT/B Immunity	EN61000-4-4: 2004+A1:2010	B	Pass
Surge Immunity	EN61000-4-5: 2006	B	Pass
Conducted RF Immunity	EN61000-4-6: 2009	A	Pass
Power frequency magnetic field	EN61000-4-8: 2010	A	Pass
Voltage dips, >95% reduction	EN61000-4-11:2004	B	Pass
Voltage dips, 30% reduction		C	Pass
Voltage interruptions		C	Pass
Note: N/A is an abbreviation for Not Applicable.			

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT	:	Inverter
Model Number	:	APC1024E, APC1524E, APC2024E, APC3024E, APC4024E, APC5024E, APC6024E (Note: This series of Inverter generally uses the same circuit diagrams. Unless otherwise specified, the tests are conducted on model APC3024E and APC6024E considered the worst condition. We prepare APC6024E for EMI test and take APC3024E for EMC test.)
Input and Output	:	APC1024E: Input: 220~240VAC, 50/60Hz, 10A MAX, 1Ø Output: 220~240VAC, 50/60Hz, 1000W, 1Ø APC1524E: Input: 220~240VAC, 50/60Hz, 20A MAX, 1Ø Output: 220~240VAC, 50/60Hz, 1500W, 1Ø APC2024E: Input: 220~240VAC, 50/60Hz, 20A MAX, 1Ø Output: 220~240VAC, 50/60Hz, 2000W, 1Ø APC3024E: Input: 220~240VAC, 50/60Hz, 30A MAX, 1Ø Output: 220~240VAC, 50/60Hz, 3000W, 1Ø APC4024E: Input: 220~240VAC, 50/60Hz, 30A MAX, 1Ø Output: 220~240VAC, 50/60Hz, 4000W, 1Ø APC5024E: Input: 220~240VAC, 50/60Hz, 40A MAX, 1Ø Output: 220~240VAC, 50/60Hz, 5000W, 1Ø APC6024E: Input: 220~240VAC, 50/60Hz, 40A MAX, 1Ø Output: 220~240VAC, 50/60Hz, 6000W, 1Ø Battery of all the models: 24VDC
Test Voltage	:	AC230V/50Hz
Applicant	:	Tortech Pty Ltd
Date of receiver	:	October 08, 2011
Manufacturer		
Date of Test	:	October 08, 2011 to October 15, 2011
Address		

2.2. Description of Test Facility

Site Description		
EMC Lab.	:	Accredited by CNAS, 2010.10.29 The certificate is valid until 2013.10.28 The Laboratory has been assessed and proved to be in compliance with CNAS-CL01: 2006(identical to ISO/IEC17025: 2005) The Certificate Registration Number is L2291 Accredited by TUV Rheinland Shenzhen, 2010.5 The Laboratory has been assessed according to the requirements ISO/IEC 17025. Accredited by FCC, October 28, 2010 The Certificate Registration Number is 406365. Accredited by Industry Canada, March 5, 2010 The Certificate Registration Number is 46405-4480
Name of Firm	:	SHENZHEN EMTEK CO., LTD
Site Location	:	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

2.3. Measurement Uncertainty

Radiation Emission Uncertainty	:	3.3dB (3m Chamber)
Conduction Emission Uncertainty	:	2.6dB

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1. For Power Line Conducted Emission

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCS30	828985/018	May 29, 2011	1 Year
2.	L.I.S.N.	Schwarzbeck	NNLK8129	8129203	May 29, 2011	1 Year
3.	50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
4.	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	May 29, 2011	1 Year
5.	Voltage Probe	Rohde & Schwarz	TK9416	N/A	May 29, 2011	1 Year
6.	I.S.N	Rohde & Schwarz	ENY22	1109.9508.02	May 29, 2011	1 Year

3.2. For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 29, 2011	1 Year
2.	Pre-Amplifier	HP	8447D	2944A07999	May 29, 2011	1 Year
3.	Bilog Antenna	Schwarzbeck	VULB9163	142	May 29, 2011	1 Year
4.	Loop Antenna	ARA	PLA-1030/B	1029	May 29, 2011	1 Year
5.	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	May 29, 2011	1 Year
6.	Horn Antenna	Schwarzbeck	BBHA 9120	D143	May 29, 2011	1 Year
7.	Cable	Schwarzbeck	AK9513	ACRX1	May 29, 2011	1 Year
8.	Cable	Rosenberger	N/A	FP2RX2	May 29, 2011	1 Year
9.	Cable	Schwarzbeck	AK9513	CRPX1	May 29, 2011	1 Year
10.	Cable	Schwarzbeck	AK9513	CRRX2	May 29, 2011	1 Year

3.3. For Harmonic Current / Flicker Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	AC Power Source	California Instruments	5001iX-CTS-400-413	72795	May 29, 2011	1 Year
2.	PC	N/A	P2L97	N/A	May 29, 2011	N/A

3.4. For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	TESEQ AG	NSG 437	000409	May 29, 2011	1 Year

3.5.For RF Strength Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Power Meter. Dual Channel	BOONTON	4232A	10539	May 29, 2011	1 Year
2.	50ohm Diode Power Sensor	BOONTON	51011EMC	34236/34238	May 29, 2011	1 Year
3.	Broad-Band Horn Antenna	SCHWARZBECK	BBHA 9120 L3F	332	May 29, 2011	1 Year
4.	Power Amplifier	PRANA	AP32MT215	N/A	May 29, 2011	1 Year
5.	Power Amplifier	MILMEGA	AS0102-55	N/A	May 29, 2011	1 Year
6.	Signal Generator	AEROFLEX	2023B	N/A	May 29, 2011	1 Year
7.	Field Strength Meter	HOLADAY	HI-6005	N/A	May 29, 2011	1 Year
8.	RS232 Fiber Optic Modem	HOLADAY	HI-4413P	N/A	May 29, 2011	1 Year
9.	Log.-Per. Antenna	SCHWARZBECK	VULP 9118E	N/A	May 29, 2011	1 Year

3.6.For Electrical Fast Transient /Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Burst Tester	HAEFELY	PEFT4010	080981-16	May 29, 2011	1Year
2.	Coupling Clamp	HAEFELY	IP-4A	147147	May 29, 2011	1Year

3.7.For Surge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Surge Controller	HAEFELY	Psurge 8000	174031	May 29, 2011	1Year
2.	Impulse Module	HAEFELY	PIM 100	174124	May 29, 2011	1Year
3.	Coupling Decoupling Filter	HAEFELY	PCD 130	172181	May 29, 2011	1Year
4.	Coupling Module	HAEFELY	PCD122	174354	May 29, 2011	1Year
5.	Surge Impulse Module	HAEFELY	PIM 120	174435	May 29, 2011	1Year
6.	Coupling Module	HAEFELY	PCD 126A	174387	May 29, 2011	1Year
7.	Impulse Module	HAEFELY	PIM 110	174391	May 29, 2011	1Year

3.8.For Injected Current Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Simulator	EMTEST	CWS500C	0900-12	May 29, 2011	1Year
2.	CDN	EMTEST	CDN-M2	5100100100	May 29, 2011	1Year
3.	CDN	EMTEST	CDN-M3	0900-11	May 29, 2011	1Year
4.	Injection Clamp	EMTEST	F-2031-23 MM	368	May 29, 2011	1Year
5.	Attenuator	EMTEST	ATT6	0010222A	May 29, 2011	1Year

3.9.For Magnetic Field Immunity Test

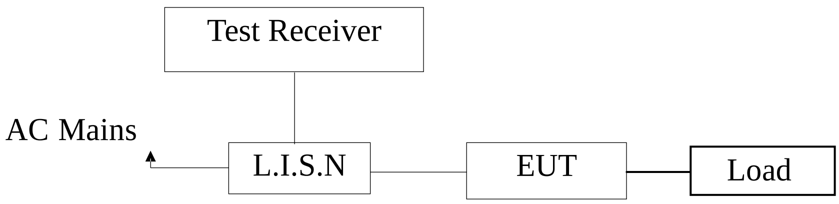
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Magnetic Field Tester	HAEFELY	MAG100	250040.1	May 29, 2011	1Year

3.10.For Voltage Dips and Interruptions Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Dips Tester	HAEFELY	Pline1610	083732-12	May 29, 2011	1Year

4. POWER LINE CONDUCTED EMISSION MEASUREMENT

4.1.Block Diagram of Test Setup



(EUT: Inverter)

4.2.Measuring Standard

EN 55022:2006+A1:2007
Power Line Conducted Emission Limits (Class A)

Frequency (MHz)	Limit (dBμV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	79	66
0.50 ~ 30.00	73	60
NOTE1-The lower limit shall apply at the transition frequencies.		

4.3.EUT Configuration on Measurement

The following equipments are installed on Conducted Emission Measurement to meet EN 55022 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

4.4. Operating Condition of EUT

4.4.1.Setup the EUT as shown on Section 4.1.

4.4.2.Turn on the power of all equipments.

4.4.3.Let the EUT work in measuring mode (Full Load) and measure it.

4.5.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided 50ohm-coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN 55022 regulations during conducted emission measurement.
The bandwidth of the field strength meter (R&S Test Receiver ESCS30) is set at 9KHz in 150KHz~30MHz and 200Hz in 9KHz~150KHz.
The frequency range from 150kHz to 30MHz is investigated
All the scanning waveforms are put in Appendix I.

4.6 Measuring Results

PASS.

Please reference to Appendix I.

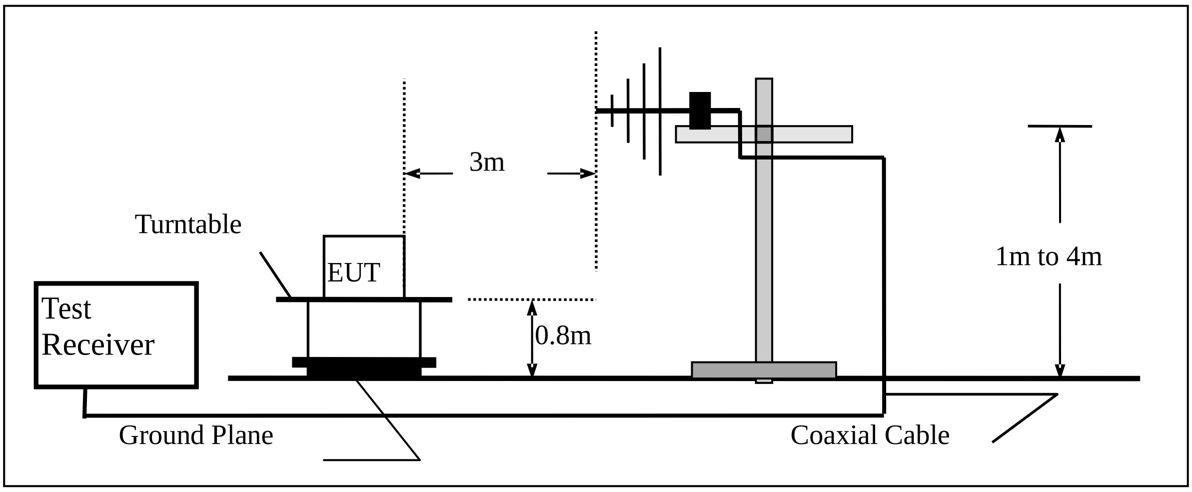
5. RADIATED EMISSION MEASUREMENT

5.1.Block Diagram of Test

5.1.1.Block diagram of connection between the EUT and simulators

(EUT: Inverter)

5.1.2.Block diagram of test setup (In chamber)



(EUT: Inverter)

5.2.Measuring Standard

EN55022: 2006+A1:2007

5.3.Radiated Emission Limits

All emanations from a class A device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dBμV/m)
30 ~ 230	3	50
230 ~ 1000	3	57

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.
(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

5.4.EUT Configuration on Test

The EN55022 regulations test method must be used to find the maximum emission during radiated emission measurement.

5.5. Operating Condition of EUT

5.5.1. Turn on the power.

5.5.2. After that, let the EUT work in test mode (Full Load) and measure it.

5.6. Test Procedure

The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

The bandwidth of the Receiver (ESU26) is set at 120kHz.
All the scanning curves are attached in Appendix II.

5.7. Measuring Results

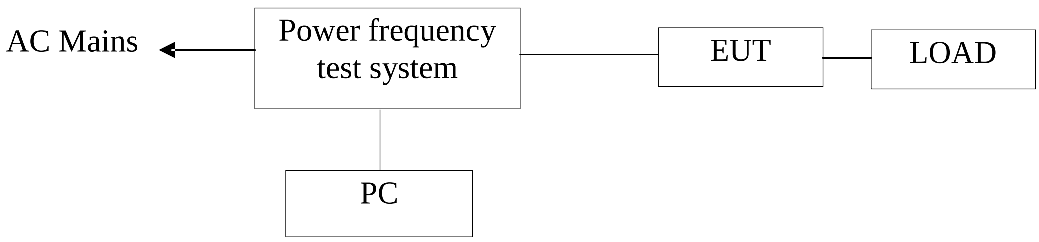
PASS.

The frequency range from 30MHz to 1000MHz is investigated.

Please reference to Appendix II.

6. HARMONIC CURRENT EMISSION MEASUREMENT

6.1 Block Diagram of Test Setup



(EUT: Inverter)

6.2 Measuring Standard

EN 61000-3-2:2006+A1:2009+A2:2009

6.3 Operation Condition of EUT

Same as Section 4.4, except the test setup replaced as Section 6.1.

6.4 Measuring Results

PASS.

Please refer to the following pages.

Test Report

Report title:	HARMONIC
Company Name:	EMTEK
Date of test:	10:07 10.Oct 2011
Measurement file name:	Harmonics_3_2_Ed3.rsd
Tester:	KL
Standard used:	EN/IEC 61000-3-2 Ed.3 Short cyclic Equipment class A <= 150% of the limit
Observation time:	150s
Windows width:	10 periods - (EN/IEC 61000-4-7 Edition 2002)
E. U. T.:	Inverter
M/N:	APC3024E

Test Result	
E. U. T.:	PASS
Power Source:	PASS

E. U. T. Result

Check harmonics 2..40 [exception odd 21..39]:

Harmonic(s) > 150%:	
Order (n):	None
Harmonic(s) with average > 100%:	
Order (n):	None

Check odd harmonics 21..39:

All Partial Odd Harmonics below partial limits.	
Harmonic(s) > 150%:	
Order (n):	None
Harmonic(s) with average > 150%:	
Order (n):	None

Power Source Result

First dataset out of limit:	
DS (time):	None
Harmonic(s) out of limit:	
Order (n):	None

Average harmonic current results

Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
1	6.210	100.000		
2	5.724E-3	0.092	1.08	PASS
3	213.490E-3	3.438	2.30	PASS
4	4.218E-3	0.068	430.00E-3	PASS
5	96.058E-3	1.547	1.14	PASS
6	2.958E-3	0.048	300.00E-3	PASS
7	51.233E-3	0.825	770.00E-3	PASS
8	2.805E-3	0.045	230.00E-3	PASS
9	15.506E-3	0.250	400.00E-3	PASS
10	2.271E-3	0.037	184.00E-3	PASS
11	20.979E-3	0.338	330.00E-3	PASS
12	2.061E-3	0.033	153.33E-3	PASS
13	11.695E-3	0.188	210.00E-3	PASS
14	1.987E-3	0.032	131.43E-3	PASS
15	11.343E-3	0.183	150.00E-3	PASS
16	2.274E-3	0.037	115.00E-3	PASS
17	10.129E-3	0.163	132.35E-3	PASS
18	2.009E-3	0.032	102.22E-3	PASS
19	5.617E-3	0.090	118.42E-3	PASS
20	1.770E-3	0.028	92.00E-3	PASS
21	8.640E-3	0.139	160.71E-3	PASS
22	2.065E-3	0.033	83.64E-3	PASS
23	7.488E-3	0.121	146.74E-3	PASS
24	1.820E-3	0.029	76.66E-3	PASS
25	5.217E-3	0.084	135.00E-3	PASS
26	1.814E-3	0.029	70.77E-3	PASS
27	5.079E-3	0.082	124.99E-3	PASS
28	1.877E-3	0.030	65.71E-3	PASS
29	4.829E-3	0.078	116.39E-3	PASS
30	1.925E-3	0.031	61.33E-3	PASS
31	4.896E-3	0.079	108.87E-3	PASS
32	2.117E-3	0.034	57.50E-3	PASS
33	4.153E-3	0.067	102.27E-3	PASS
34	2.669E-3	0.043	54.12E-3	PASS
35	4.810E-3	0.077	96.44E-3	PASS
36	2.965E-3	0.048	51.11E-3	PASS
37	6.015E-3	0.097	91.21E-3	PASS
38	3.092E-3	0.050	48.42E-3	PASS
39	7.126E-3	0.115	86.53E-3	PASS
40	3.644E-3	0.059	46.00E-3	PASS

Maximum harmonic current results

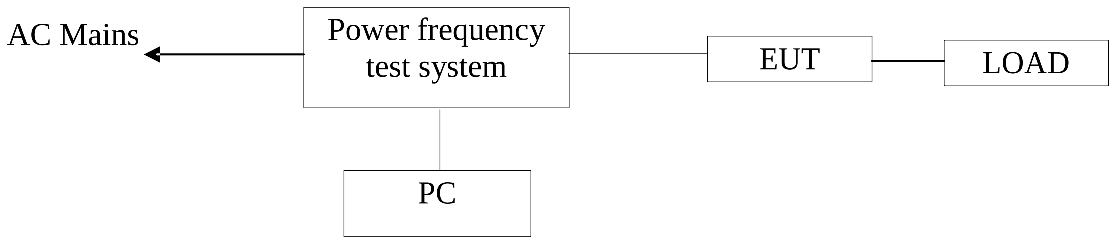
Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
1	6.401	100.000		
2	41.602E-3	0.650	1.62	PASS
3	229.040E-3	3.578	3.45	PASS
4	21.847E-3	0.341	645.00E-3	PASS
5	120.239E-3	1.878	1.71	PASS
6	12.083E-3	0.189	450.00E-3	PASS
7	69.309E-3	1.083	1.15	PASS
8	8.855E-3	0.138	345.00E-3	PASS
9	28.250E-3	0.441	600.00E-3	PASS
10	7.054E-3	0.110	276.00E-3	PASS
11	31.828E-3	0.497	495.00E-3	PASS
12	6.066E-3	0.095	229.99E-3	PASS
13	22.240E-3	0.347	315.00E-3	PASS
14	5.303E-3	0.083	197.15E-3	PASS
15	16.128E-3	0.252	225.00E-3	PASS
16	5.035E-3	0.079	172.50E-3	PASS
17	16.476E-3	0.257	198.52E-3	PASS
18	4.375E-3	0.068	153.33E-3	PASS
19	8.984E-3	0.140	177.63E-3	PASS
20	3.940E-3	0.062	138.00E-3	PASS
21	15.493E-3	0.242	160.71E-3	PASS
22	4.102E-3	0.064	125.46E-3	PASS
23	14.278E-3	0.223	146.74E-3	PASS
24	3.668E-3	0.057	114.99E-3	PASS
25	9.769E-3	0.153	135.00E-3	PASS
26	3.287E-3	0.051	106.16E-3	PASS
27	10.213E-3	0.160	124.99E-3	PASS
28	3.134E-3	0.049	98.57E-3	PASS
29	7.656E-3	0.120	116.39E-3	PASS
30	3.091E-3	0.048	92.00E-3	PASS
31	8.421E-3	0.132	108.87E-3	PASS
32	3.267E-3	0.051	86.25E-3	PASS
33	7.553E-3	0.118	102.27E-3	PASS
34	3.952E-3	0.062	81.18E-3	PASS
35	8.862E-3	0.138	96.44E-3	PASS
36	4.640E-3	0.072	76.66E-3	PASS
37	8.364E-3	0.131	91.21E-3	PASS
38	4.659E-3	0.073	72.63E-3	PASS
39	10.064E-3	0.157	86.53E-3	PASS
40	5.300E-3	0.083	69.00E-3	PASS

Maximum harmonic voltage results

Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	230.75	100.328		
2	32.51E-3	0.014	0.2	PASS
3	187.95E-3	0.082	0.9	PASS
4	41.73E-3	0.018	0.2	PASS
5	65.35E-3	0.028	0.4	PASS
6	38.40E-3	0.017	0.2	PASS
7	69.98E-3	0.030	0.3	PASS
8	25.99E-3	0.011	0.2	PASS
9	86.93E-3	0.038	0.2	PASS
10	12.44E-3	0.005	0.2	PASS
11	35.84E-3	0.016	0.1	PASS
12	15.99E-3	0.007	0.1	PASS
13	77.85E-3	0.034	0.1	PASS
14	27.41E-3	0.012	0.1	PASS
15	88.87E-3	0.039	0.1	PASS
16	35.54E-3	0.015	0.1	PASS
17	83.83E-3	0.036	0.1	PASS
18	17.24E-3	0.007	0.1	PASS
19	71.41E-3	0.031	0.1	PASS
20	22.41E-3	0.010	0.1	PASS
21	84.72E-3	0.037	0.1	PASS
22	22.38E-3	0.010	0.1	PASS
23	75.45E-3	0.033	0.1	PASS
24	19.75E-3	0.009	0.1	PASS
25	60.64E-3	0.026	0.1	PASS
26	23.04E-3	0.010	0.1	PASS
27	65.45E-3	0.028	0.1	PASS
28	25.46E-3	0.011	0.1	PASS
29	60.59E-3	0.026	0.1	PASS
30	28.13E-3	0.012	0.1	PASS
31	66.56E-3	0.029	0.1	PASS
32	33.87E-3	0.015	0.1	PASS
33	54.14E-3	0.024	0.1	PASS
34	35.69E-3	0.016	0.1	PASS
35	70.81E-3	0.031	0.1	PASS
36	39.81E-3	0.017	0.1	PASS
37	67.11E-3	0.029	0.1	PASS
38	39.92E-3	0.017	0.1	PASS
39	77.43E-3	0.034	0.1	PASS
40	46.41E-3	0.020	0.1	PASS

7. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

7.1Block Diagram of Test Setup



(EUT: Inverter)

7.2Measuring Standard

EN 61000-3-3: 2008

7.3Operation Condition of EUT

Same as Section 4.4, except the test setup replaced as Section 7.1.

7.4Measuring Results

PASS.

Please see the attached pages.

Test Report

Report title:	FLICKER
Company Name:	EMTEK
Date of test:	10:24 10.Oct 2011
Tester:	KL
Standard used:	EN/IEC 61000-3-3 Flicker
Short time (Pst):	10 min
Observation time:	10 min (1 Flicker measurement)
Flickermeter:	230V / 50Hz
Flicker Impedance:	Zref (IEC 60725)
E. U. T.:	Inverter
M/N:	APC3024E

Test Result	PASS

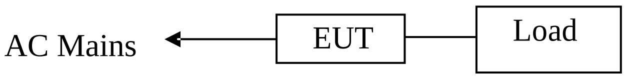
Maximum Flicker results

	EUT values	Limit	Result
Pst	0.325	1.00	PASS
dc [%]	0.903	3.30	PASS
dmax [%]	1.972	4.00	PASS
dt [s]	0.000	0.50	PASS

8. ELECTROSTATIC DISCHARGE IMMUNITY TEST

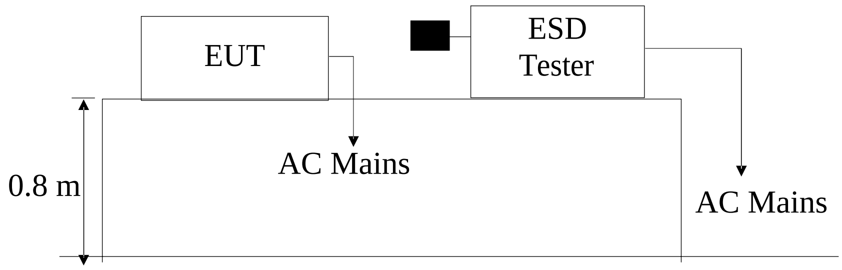
8.1 Block Diagram of Test Setup

8.1.1 Block diagram of connection between the EUT and simulators



(EUT: Inverter)

8.1.2 Block diagram of ESD test setup



(EUT: Inverter)

8.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-2: 2009
Severity Level: 3 / Air Discharge: ±8KV   Level: 2 / Contact Discharge: ±4KV)

8.3 Severity Levels and Performance Criterion

8.3.1 Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	±2	±2
2.	±4	±4
3.	±6	±8
4.	±8	±15
X	Special	Special

8.3.2 Performance criterion: **B**

8.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

8.5 Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.4. Except the test set up replaced by Section 8.1.

8.6 Test Procedure

8.6.1 Air Discharge**:**

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

8.6.2 Contact Discharge**:**

All the procedure shall be same as Section 8.6.1. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

8.6.3 Indirect discharge for horizontal coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

8.6.4 Indirect discharge for vertical coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

8.7 Test Results

PASS

Please refer to the following pages

Electrostatic Discharge Test Result

SHENZHEN EMTEK CO., LTD

		Test Date :	October 10, 2011
EUT :	Inverter	Temperature :	22℃
M/N :	APC3024E	Humidity :	50%
Power supply :	AC 230V/50Hz	Test Mode :	Full Load
Air discharge :	＋8.0KV	Criterion :	B
Contact discharge:	＋4.0KV	Test Engineer :	Zone

Location	**Kind** A-Air Discharge C-Contact Discharge	**Result**
Slot of the EUT	A	PASS
Button	A	PASS
Screw	C	PASS
Metal	C	PASS
HCP	C	PASS
VCP of front	C	PASS
VCP of rear	C	PASS
VCP of left	C	PASS
VCP of right	C	PASS

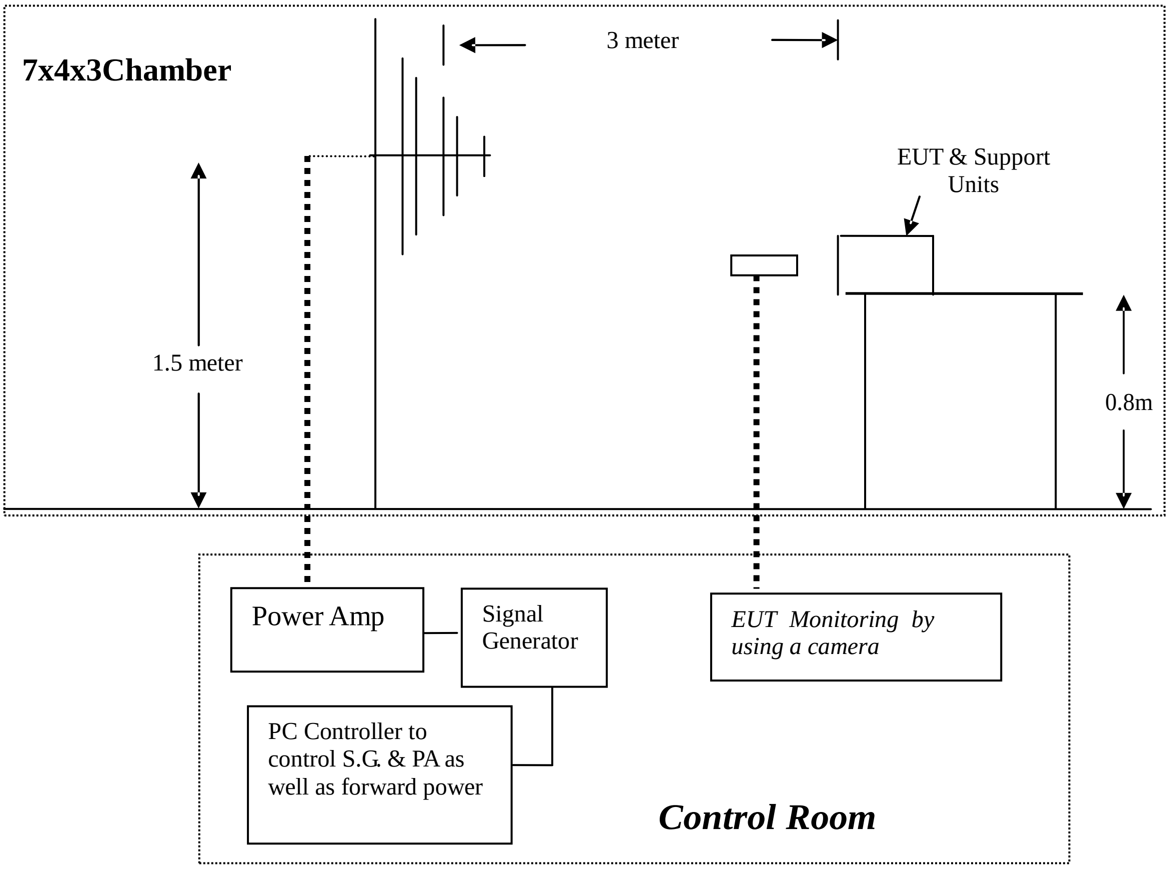
9. RF FIELD STRENGTH SUSCEPTIBILITY TEST

9.1 Block Diagram of Test

9.1.1 Block diagram of connection between the EUT and Load

(EUT: Inverter)

9.1.2 Block diagram of RS test setup



(EUT: Inverter)

9.2Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-3: 2006+A1:2008+A2:2010 (Severity Level: 2, 3V / m))

9.3Severity Levels and Performance Criterion

9.3.1 Severity Levels

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

9.3.2 Performance Criterion : **A**

9.4 EUT Configuration on Test

The configuration of the EUT is same as Section 4.3.

9.5 Operating Condition of EUT

Same as radiated emission measurement, which is listed in Section 4.4, except the test setup replaced as Section 9.1.

9.6 Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.

In order to judge the EUT performance, a CCD camera is used to monitor its screen.

All the scanning conditions are as following:

Condition of Test	Remark
1. Fielded Strength	3V/m (Severity Level 2)
2. Radiated Signal	Modulated
3. Scanning Frequency	80-1000MHz
4. Sweep time of radiated	0.0015 Decade/s
5. Dwell Time	1 Sec.

9.7 Test Results

PASS.

Please refer to the following page.

RF Field Strength Susceptibility Test Results

SHENZHEN EMTEK CO., LTD.

EUT	: Inverter	Test Date	: October 10, 2011
M/N :	APC3024E	Temperature	: 22℃
Field Strength :	3V/m	Humidity	: 50 ％
Power Supply :	AC 230V/50Hz	Criterion	: A
Test Engineer:	Zone	Test Mode	: Full Load
		Frequency Range:	80 MHz to 1000 MHz

Modulation: ☐None ☐ Pulse ☒AM 1KHz 80%

	Frequency Rang 1: 80~ 1000MHz		Frequency Rang 2:	
Steps	# / %		# / %	
	Horizontal	Vertical	Horizontal	Vertical
Front	PASS	PASS		
Right	PASS	PASS		
Rear	PASS	PASS		
Left	PASS	PASS		

Test Equipment **:**
1. Signal Generator : 2023B (AEROFLEX)
2. Power Amplifier : AS0102-55(MILMEGA)&AP32MT215(PRANA)
3. Log.-Per.Antenna: VULP9118E(SCHWARZBECK)
4. Broad-Band Horn Antenna: BBHA 9120L3F(SCHWARZBECK)
5. RF Power Meter. Dual Channel: 4232A(BOONTON)
6. Field Strength Meter: HI-6005(HOLADAY)

Note:

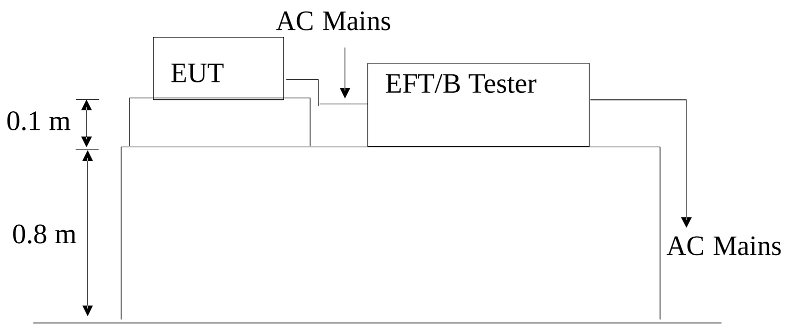
10. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

10.1 Block Diagram of Test Setup

10.1.1.Block Diagram of the EUT

(EUT: Inverter)

10.1.2.EFT Test Setup



10.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-4: 2004+A1:2010, Severity Level, Level 2**:** 1KV)

10.3 Severity Levels and Performance Criterion

10.3.1 Severity level

Open Circuit Output Test Voltage ±10％		
Level	On Inverter Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 KV	0.25 KV
2.	1 KV	0.5 KV
3.	2 KV	1 KV
4.	4 KV	2 KV
X	Special	Special

10.3.2 Performance criterion **: B**

10.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

10.5 Operating Condition of EUT

10.5.1 Setup the EUT as shown in Section 10.1.

10.5.2 Turn on the power of all equipments.

10.5.3 Let the EUT work in test mode (Full Load) and measure it.

10.6 Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

10.6.1 For input and output AC power ports**:**

The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

10.6.2 For signal lines and control lines ports**:**

No I/O ports. It's unnecessary to test.

10.6.3 For DC output line ports**:**

It's unnecessary to test.

10.7 Test Result

PASS.

Please refer to the following page.

Electrical Fast Transient/Burst Test Results

SHENZHEN EMTEK CO., LTD.

Standard	☐ IEC 61000-4-4 ☒ EN 61000-4-4	Result: ☒ PASS / ☐ FAIL

EUT : Inverter M/N : APC3024E

Input Voltage: AC 230 V 50 HZ

Criterion : B

Ambient Condition : 22 ℃ 50% RH

Operation Mode: Charging			
Line : ☒ AC Mains		Line : ☐ Signal ☐ I/O Cable	
Coupling : ☒ Direct		Coupling : ☐ Capacitive	
Test Time : 120s			
Line	Test Voltage	Result (+)	Result (-)
L	1KV	PASS	PASS
N	1KV	PASS	PASS
PE	1KV	PASS	PASS
L、N	1KV	PASS	PASS
L、PE	1KV	PASS	PASS
N、PE	1KV	PASS	PASS
L、N、PE	1KV	PASS	PASS
Signal Line			
DC Line			
Note:			
Test Equipment		Burst Tester Model: PEFT 4010	

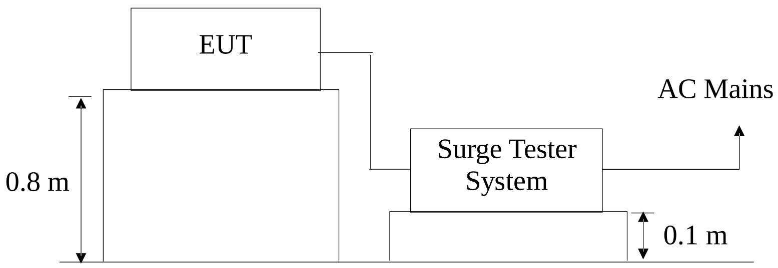
11. SURGE IMMUNITY TEST

11.1 Block Diagram of Test Setup

11.1.1 Block Diagram of the EUT

(EUT: Inverter)

11.1.2. Surge Test Setup



11.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-5: 2006)
Severity Level**:** Line to Line: Level 2, 1.0KV, Level 3**:** 2KV

11.3 Severity Levels and Performance Criterion

11.3.1.Severity level

Severity Level	Open-Circuit Test Voltage KV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

11.3.2 Performance criterion: **B**

11.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

11.5 Operating Condition of EUT

11.5.1 Setup the EUT as shown in Section 11.1.

11.5.2. Turn on the power of all equipments.

11.5.3.Let the EUT work in test mode (Full Load) and measure it.

11.6 Test Procedure

1) Set up the EUT and test generator as shown on Section 11.1.2.
2) For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge
   For line to earth coupling mode, provide a 2.0 kV 1.2/50us voltage surge.
   (at open-circuit condition) and 8/20us current surge to EUT selected points.
3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
4) Different phase angles are done individually.
5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

11.7 Test Result

PASS.

Please refer to the following page.

Surge Immunity Test Result

SHENZHEN EMTEK CO., LTD.

EUT : Inverter M/N : APC3024E Power Supply: AC 230V / 50Hz Test Engineer: Zone	Test Date : October 10, 2011 Temperature : 22℃ Humidity : 50% Test Mode : Full Load Criterion : B

Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (KV)	Result
L-N	+	0^o	5	1.0	PASS
	+	90^o	5	1.0	PASS
	+	180^o	5	1.0	PASS
	+	270^o	5	1.0	PASS
	-	0^o	5	1.0	PASS
	-	90^o	5	1.0	PASS
	-	180^o	5	1.0	PASS
	-	270^o	5	1.0	PASS
L-PE	+	0^o	5	2.0	PASS
	+	90^o	5	2.0	PASS
	+	180^o	5	2.0	PASS
	+	270^o	5	2.0	PASS
	-	0^o	5	2.0	PASS
	-	90^o	5	2.0	PASS
	-	180^o	5	2.0	PASS
	-	270^o	5	2.0	PASS
N-PE	+	0^o	5	2.0	PASS
	+	90^o	5	2.0	PASS
	+	180^o	5	2.0	PASS
	+	270^o	5	2.0	PASS
	-	0^o	5	2.0	PASS
	-	90^o	5	2.0	PASS
	-	180^o	5	2.0	PASS
	-	270^o	5	2.0	PASS
Remark:					

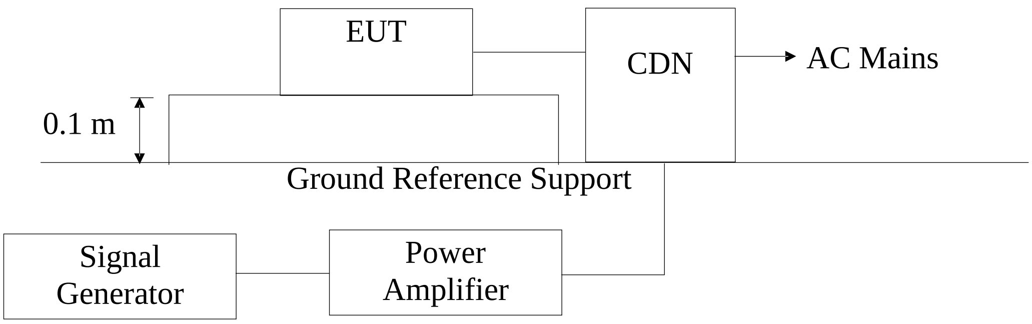
12. INJECTED CURRENTS SUSCEPTIBILITY TEST

12.1 Block Diagram of Test Setup

12.1.1 Block Diagram of the EUT

(EUT: Inverter)

12.1.2 Block Diagram of Test Setup



12.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003 (EN61000-4-6: 2009, Severity Level: Level 2, 3V (rms), (0.15MHz ~ 80MHz)

12.3 Severity Levels and Performance Criterion

12.3.1 Severity level

Level	Field Strength V
1	1
2	3
3	10
X	Special

12.3.2 Performance criterion**: A**

12.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

11.5 Operating Condition of EUT

11.5.1 Setup the EUT as shown in Section 12.1.

11.5.2 Turn on the power of all equipments.

11.5.3 Let the EUT work in test mode (Full Load) and measure it.

12.6 Test Procedure

1) Set up the EUT, CDN and test generators as shown on Section 12.1.2.
2) Let the EUT work in test mode and measure it.
3) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
4) The disturbance signal described below is injected to EUT through CDN.
5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
6) The frequency range is swept from 150KHz to80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
7) The rate of sweep shall not exceed $1.5*10^{-3}$decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

12.7Test Results

PASS.

Please refer to the following page.

Injected Currents Susceptibility Test Results

SHENZHEN EMTEK CO., LTD.

EUT : Inverter M/N : APC3024E Power Supply : AC 230V / 50Hz Test Engineer : Zone	Test Date: October 10, 2011 Temperature : 22℃ Humidity : 50%

Test Mode : Full Load

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
0.15 ~ 80	AC Mains	3V	A	PASS

Test Mode:

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result

Remark : 1. Modulation Signal:1KHz 80% AM
Measurement Equipment :
Simulator: CWS 500 (SWITZERLAND EMTEST)
CDN : ☐ CDN-M2 (SWITZERLAND EMTEST)
☒ CDN-M3 (SWITZERLAND EMTEST)

Note:

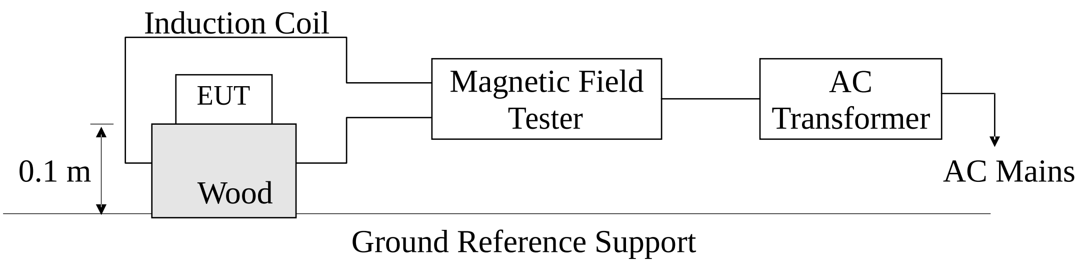
13. MAGNETIC FIELD SUSCEPTIBILITY TEST

13.1 Block Diagram of Test

13.1.1 Block diagram of test setup

(EUT: Inverter)

13.1.2 Magnetic field test setup



(EUT: Inverter)

13.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003 (EN61000-4-8: 2010, Severity Level: Level 1, 1A / m)

13.3 Severity Levels and Performance Criterion

13.3.1 Severity Levels

Level	Field Strength A/m
1	1
2	3
3	10
4	30
5	100
X	Special

13.3.2 Performance Criterion: **A**

13.4 EUT Configuration on Test

The configuration of the EUT is same as Section 4.3.

13.5 Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. The X, Y and Z polarization of the induction coil is set on test, so that each side of the EUT is affected by the magnetic field. Also can reach the same aim by change the position of the EUT.

13.6Test Results

PASS.

Please refer to the following page.

Magnetic Field Immunity Test Result

SHENZHEN EMTEK CO., LTD.

Standard	☐ IEC 61000-4-8 ☒ EN 61000-4-8	Result: ☒ Pass / ☐ Fail

EUT : Inverter M/N: APC3024E

Input Voltage : 230V 50Hz

Date of Test : October 10, 2011 Test Engineer: Zone

Ambient Condition : Temp : 22℃ Humid: 50%

Criterion : A

Operation Mode : Full Load

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result
1	5 mins	X	A	PASS
1	5 mins	Y	A	PASS
1	5 mins	Z	A	PASS

Operation Mode :

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result

Test Equipment	Magnetic Field Test : HEAFELY MAG 100.1

Note:

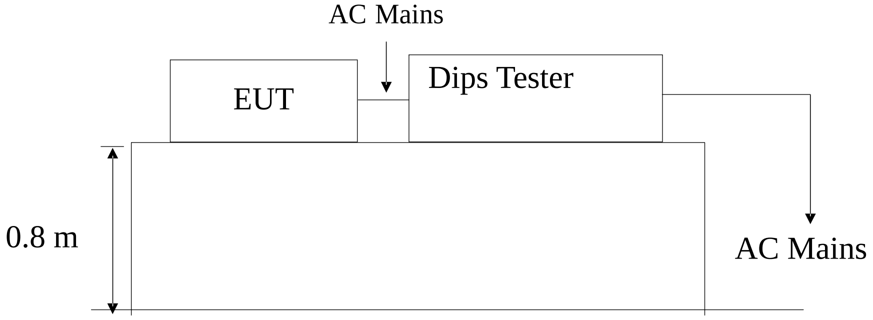
14. VOLTAGE DIPS AND INTERRUPTIONS TEST

14.1 Block Diagram of Test Setup

14.1.1 Block Diagram of the EUT

(EUT: Inverter)

14.1.2 Dips Test Setup



14.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-11: 2004)

14.3 Severity Levels and Performance Criterion

14.3.1 Severity level

Test Level %UT	Voltage dip and short interruptions %UT	Duration (in period)
0	100	0.5 1 5 10 25 50 *
40	60	
70	30	

14.3.2 Performance criterion: **B&C**

14.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

14.5 Operating Condition of EUT

14.5.1 Setup the EUT as shown in Section 14.1.

14.5.2 Turn on the power of all equipments.

14.5.3 Let the EUT work in test mode (Full Load) and measure it.

14.6 Test Procedure

1) Set up the EUT and test generator as shown on Section 14.1.2.
2) The interruption is introduced at selected phase angles with specified duration.
3) Record any degradation of performance.

14.7 Test Result

PASS.

Please refer to the following page.

Voltage Dips And Interruptions Test Results

SHENZHEN EMTEK CO., LTD.

EUT : Inverter M/N : APC3024E Power Supply : 230V / 50Hz	Test Date : October 10, 2011 Temperature : 22℃ Humidity : 50% Test Engineer : Zone

Test Mode: Full Load

Test Level % U_T	Voltage Dips & Short Interruptions % U_T	Duration (in periods)	Criterion ☐ A ☒ B ☒ C ☐ D	Result P=PASS F=Fail
0	100	0.5P	B	P
70	30	25P	C	P
0	100	250P	C	P

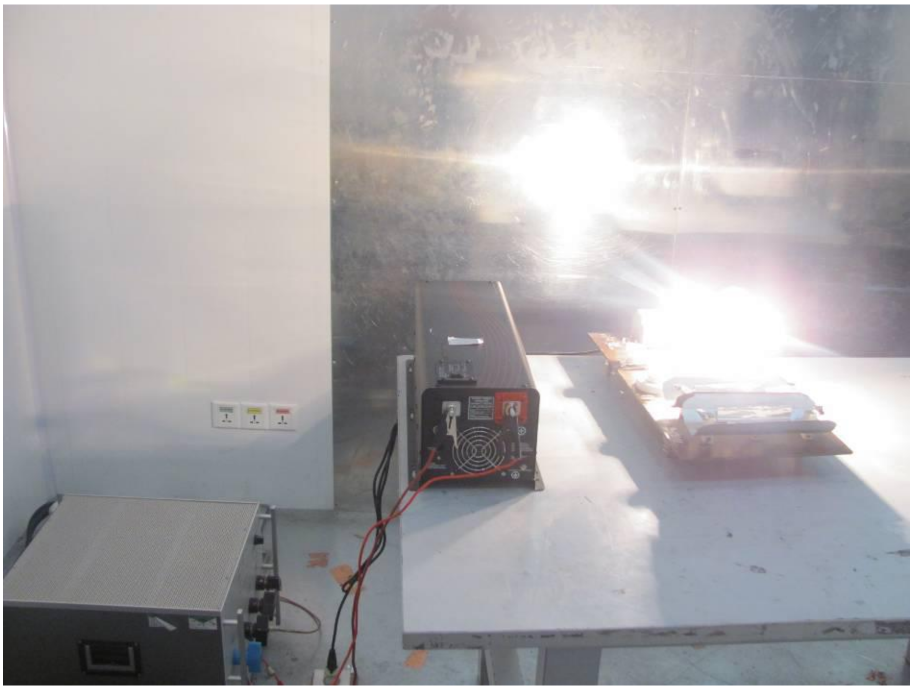
Test Mode :

Test Level % U_T	Voltage Dips & Short Interruptions % U_T	Duration (in periods)	Criterion ☐ A ☐ B ☐ C ☐ D	Result P=PASS F=FAIL

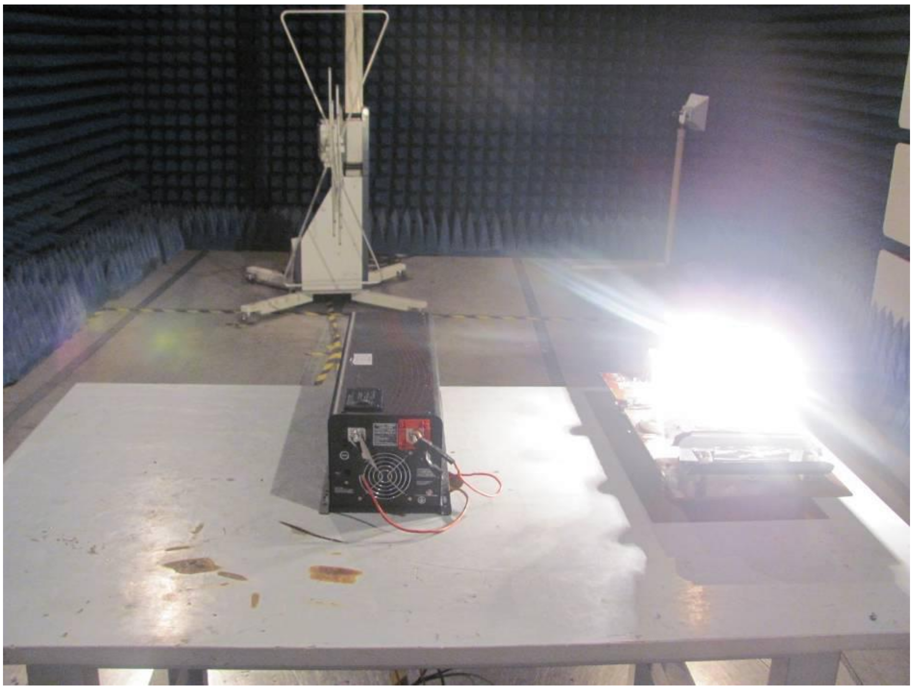
Note:

15. PHOTOGRAPH

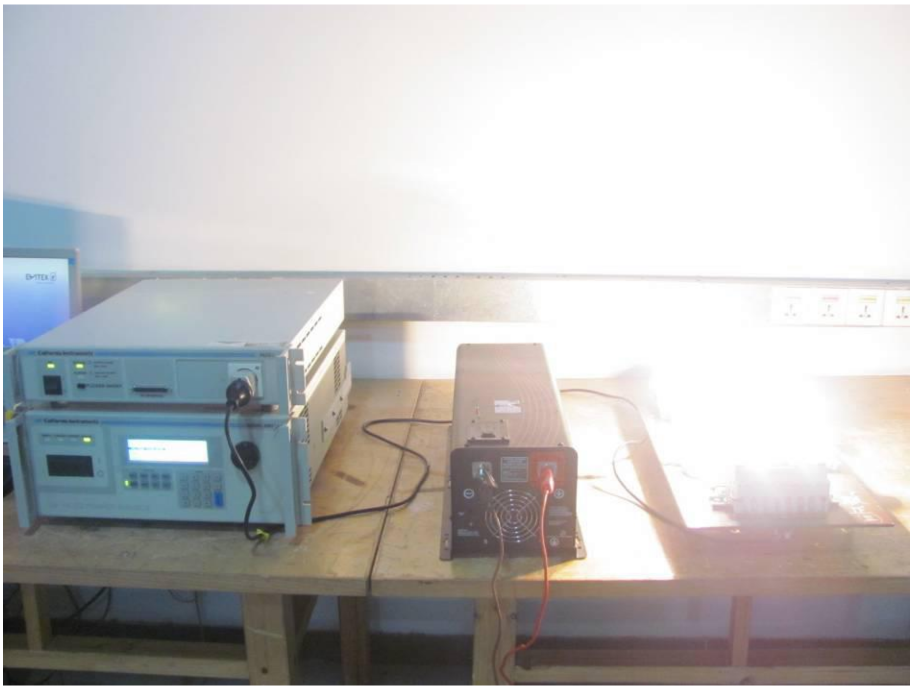
15.1 Photo of Conducted Emission Measurement



15.2 Photo of Radiation Emission Measurement

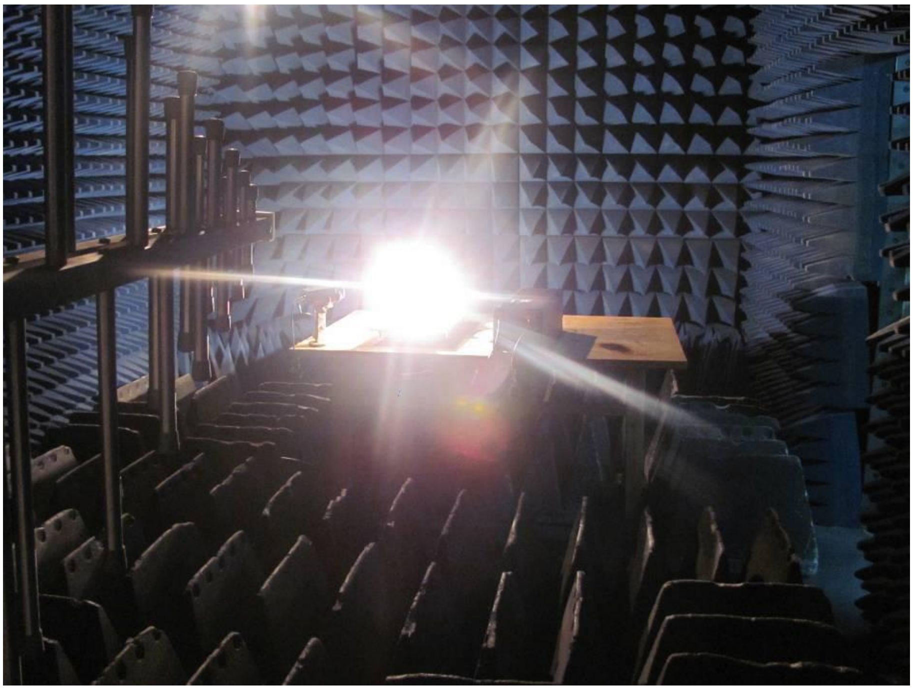


15.3 Photos of Harmonic / Flicker Measurement

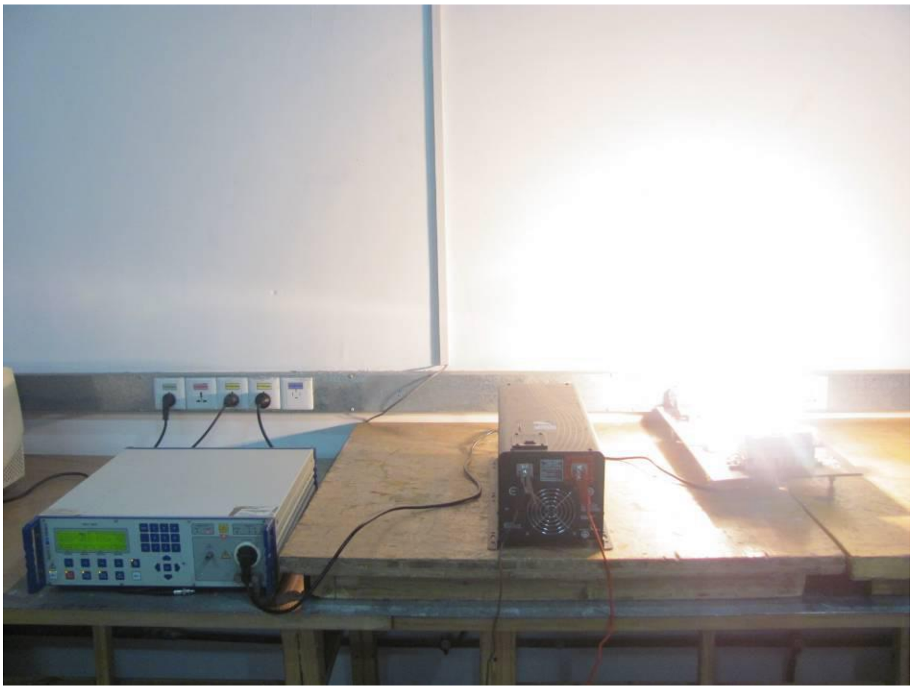


15.4 Photos of Electrostatic Discharge Test

15.5 Photos of RF Field Strength susceptibility Test

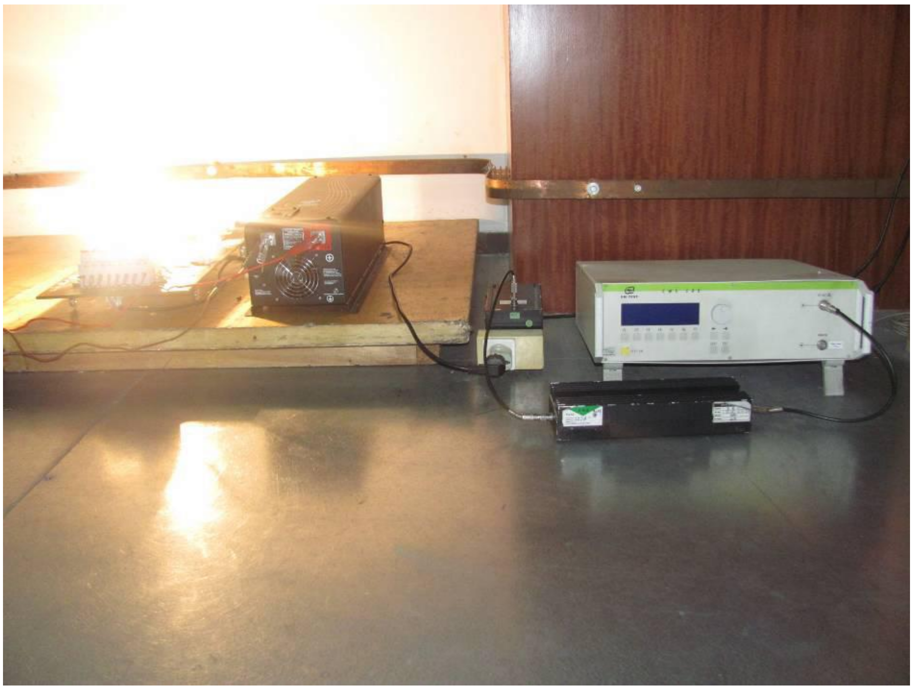


15.6 Photo of Electrical Fast Transient /Burst Test

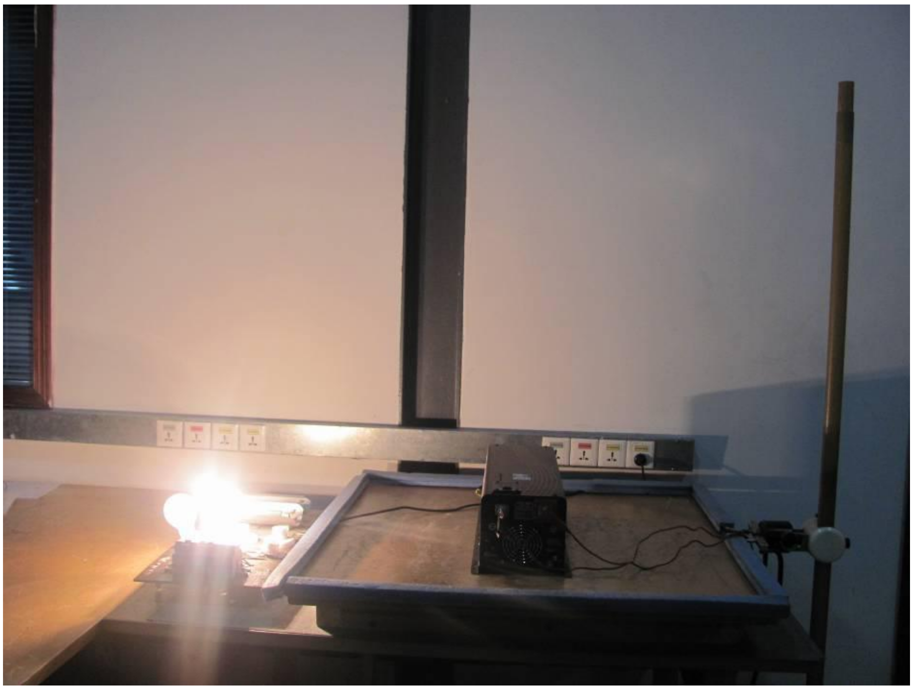


15.7 Photo of Surge Test

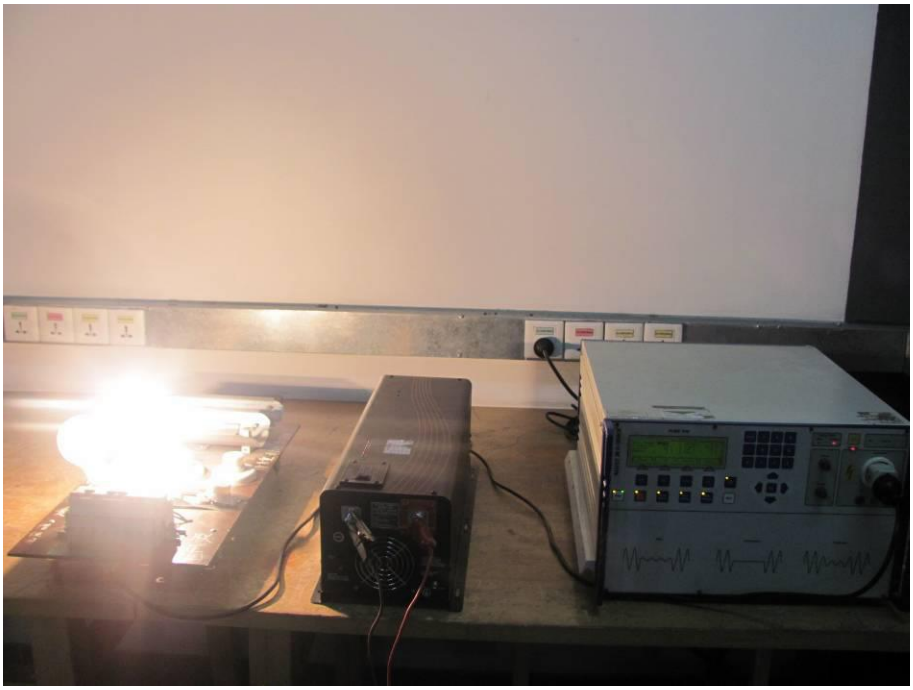
15.8 Photo of Injected Currents Susceptibility Test



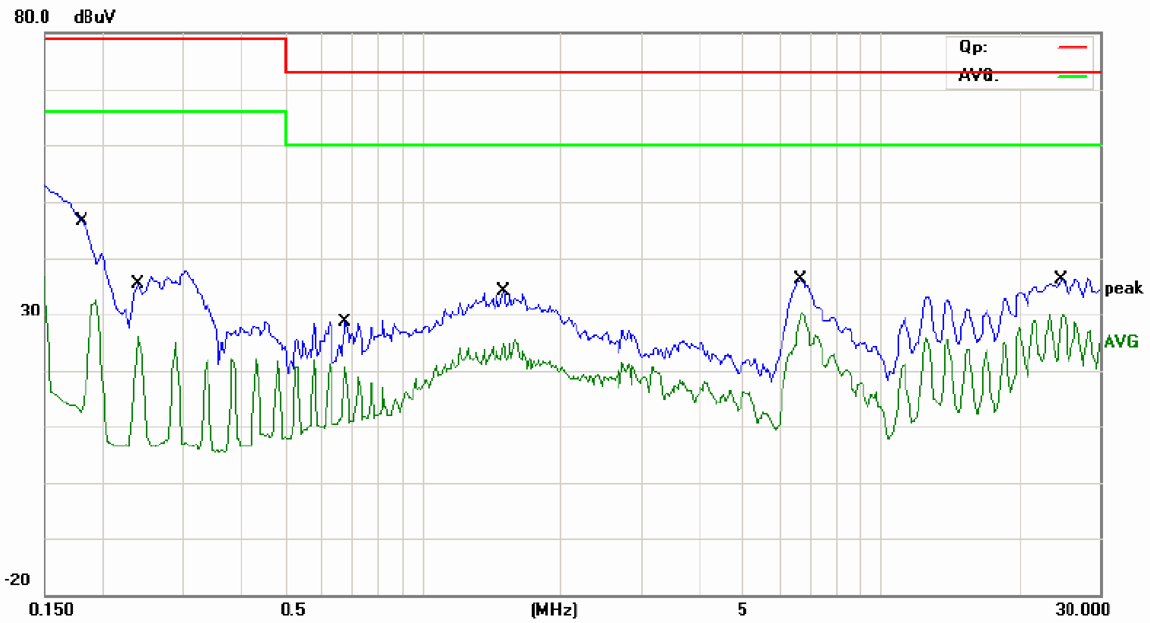
15.9 Photo of Magnetic Field Immunity Test



15.10 Photo of Voltage Dips and Interruption Immunity Test



APPENDIX I



Site Conduction #2 Phase: L1 Temperature: 26

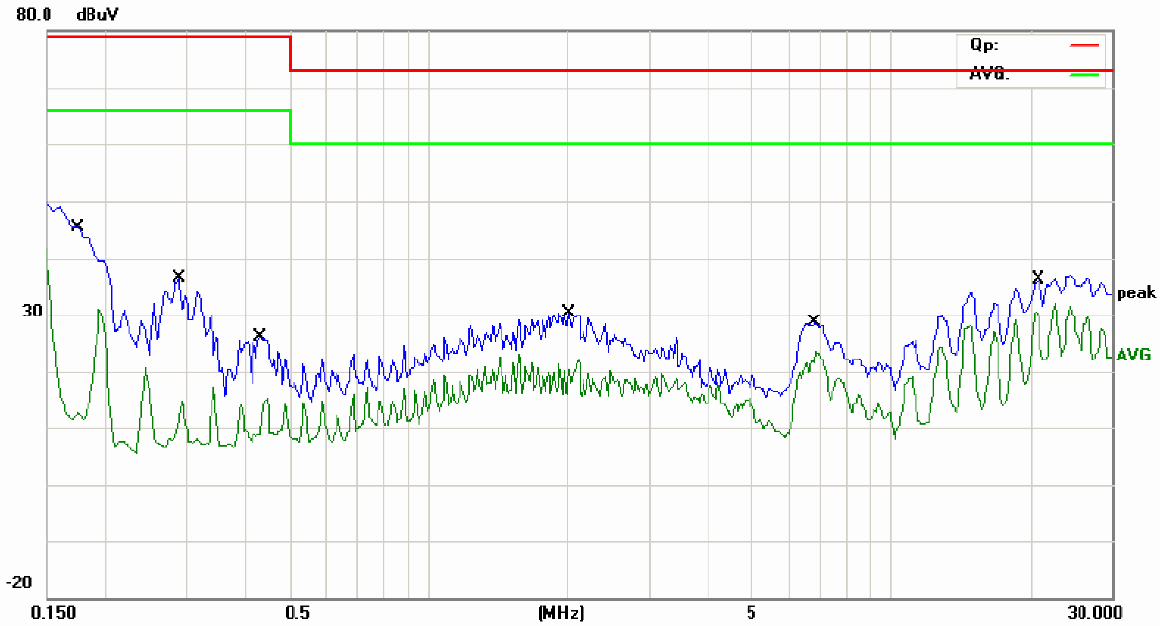
Limit: (CE)EN55022 class A_QP Power: AC 230V/50Hz Humidity: 60 %

Mode: FULL LOAD

Note: LINE MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1824	45.94	0.00	45.94	79.00	-33.06	QP	
2		0.1824	32.55	0.00	32.55	66.00	-33.45	AVG	
3		0.2400	37.61	0.00	37.61	79.00	-41.39	QP	
4		0.2400	26.11	0.00	26.11	66.00	-39.89	AVG	
5		0.6800	28.76	0.00	28.76	73.00	-44.24	QP	
6		0.6800	20.54	0.00	20.54	60.00	-39.46	AVG	
7		1.5050	34.23	0.00	34.23	73.00	-38.77	QP	
8		1.5050	25.65	0.00	25.65	60.00	-34.35	AVG	
9		6.7000	36.24	0.00	36.24	73.00	-36.76	QP	
10	*	6.7000	30.26	0.00	30.26	60.00	-29.74	AVG	
11		24.6750	36.12	0.00	36.12	73.00	-36.88	QP	
12		24.6750	30.20	0.00	30.20	60.00	-29.80	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: WOLF



Site Conduction #2 Phase: N Temperature: 26

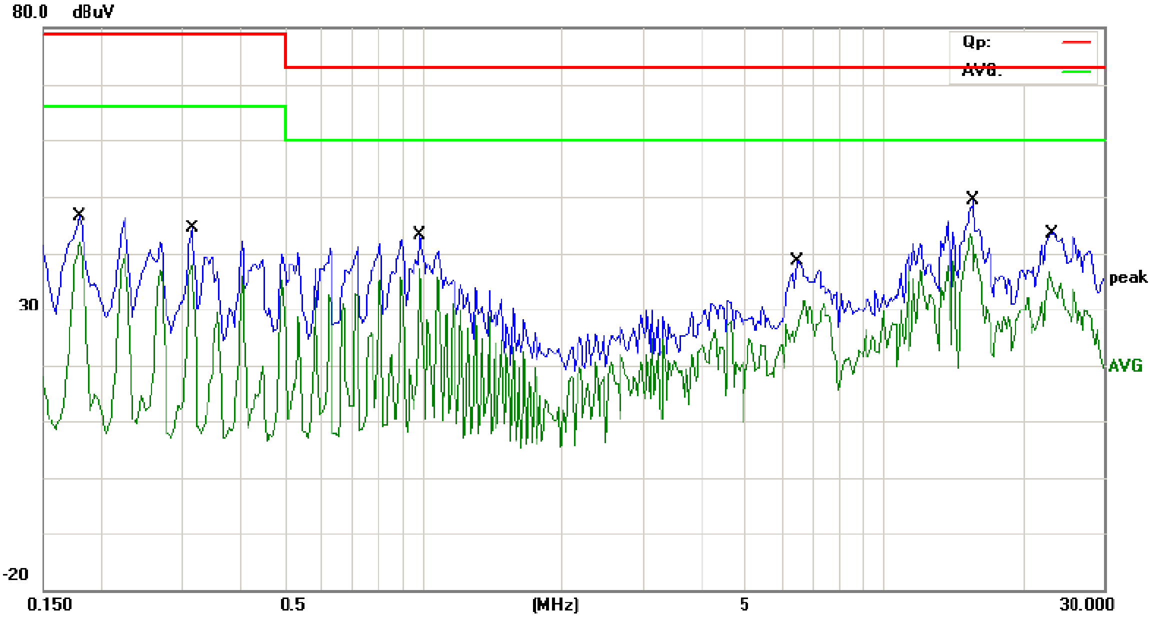
Limit: (CE)EN55022 class A_QP Power: AC 230V/50Hz Humidity: 60 %

Mode: FULL LOAD

Note: LINE MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1758	45.14	0.00	45.14	79.00	-33.86	QP	
2		0.1758	31.05	0.00	31.05	66.00	-34.95	AVG	
3		0.2900	36.27	0.00	36.27	79.00	-42.73	QP	
4		0.2900	17.41	0.00	17.41	66.00	-48.59	AVG	
5		0.4350	26.05	0.00	26.05	79.00	-52.95	QP	
6		0.4350	15.28	0.00	15.28	66.00	-50.72	AVG	
7		2.0200	30.45	0.00	30.45	73.00	-42.55	QP	
8		2.0200	22.01	0.00	22.01	60.00	-37.99	AVG	
9		6.8600	28.71	0.00	28.71	73.00	-44.29	QP	
10		6.8600	23.54	0.00	23.54	60.00	-36.46	AVG	
11		20.7038	35.83	0.00	35.83	73.00	-37.17	QP	
12	*	20.7038	32.09	0.00	32.09	60.00	-27.91	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: WOLF



Site Conduction #2 Phase: L1 Temperature: 26

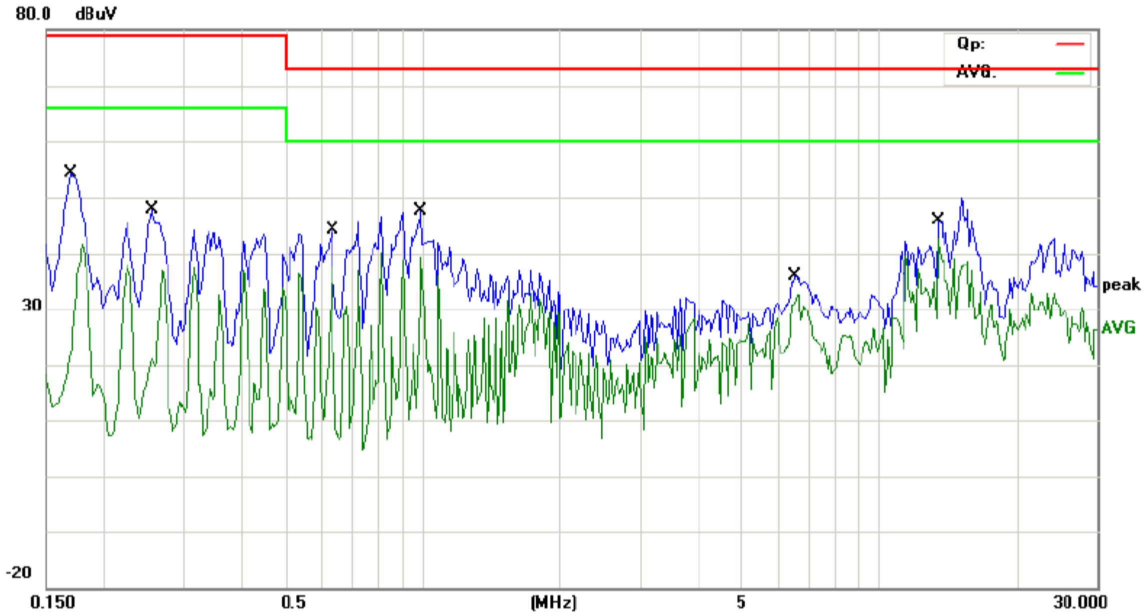
Limit: (CE)EN55022 class A_QP Power: AC 230V/50Hz Humidity: 60 %

Mode: FULL LOAD

Note: BAT MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1800	46.68	0.00	46.68	79.00	-32.32	QP	
2		0.1800	41.84	0.00	41.84	66.00	-24.16	AVG	
3		0.3150	44.45	0.00	44.45	79.00	-34.55	QP	
4		0.3150	37.99	0.00	37.99	66.00	-28.01	AVG	
5		0.9850	43.12	0.00	43.12	73.00	-29.88	QP	
6		0.9850	37.22	0.00	37.22	60.00	-22.78	AVG	
7		6.5100	38.71	0.00	38.71	73.00	-34.29	QP	
8		6.5100	31.71	0.00	31.71	60.00	-28.29	AVG	
9		15.4500	49.38	0.00	49.38	73.00	-23.62	QP	
10	*	15.4500	43.45	0.00	43.45	60.00	-16.55	AVG	
11		22.8250	43.64	0.00	43.64	73.00	-29.36	QP	
12		22.8250	36.56	0.00	36.56	60.00	-23.44	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: WOLF



Site Conduction #2 Phase: N Temperature: 26

Limit: (CE)EN55022 class A_QP Power: AC 230V/50Hz Humidity: 60 %

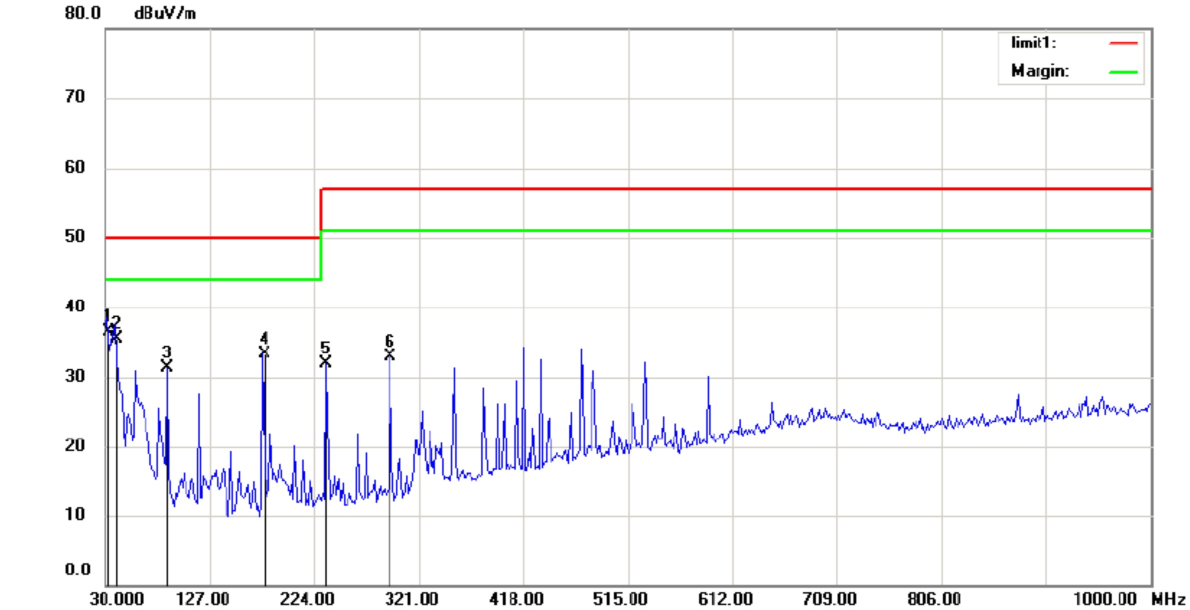
Mode: FULL LOAD

Note: BAT MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1700	54.36	0.00	54.36	79.00	-24.64	QP	
2		0.1700	41.60	0.00	41.60	66.00	-24.40	AVG	
3		0.2550	47.85	0.00	47.85	79.00	-31.15	QP	
4		0.2550	37.40	0.00	37.40	66.00	-28.60	AVG	
5		0.6350	44.21	0.00	44.21	73.00	-28.79	QP	
6		0.6350	40.14	0.00	40.14	60.00	-19.86	AVG	
7		0.9950	47.65	0.00	47.65	73.00	-25.35	QP	
8		0.9950	39.45	0.00	39.45	60.00	-20.55	AVG	
9		6.5700	35.82	0.00	35.82	73.00	-37.18	QP	
10		6.5700	32.63	0.00	32.63	60.00	-27.37	AVG	
11		13.4250	49.91	0.00	49.91	73.00	-23.09	QP	
12	*	13.4250	42.56	0.00	42.56	60.00	-17.44	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: WOLF

APPENDIX II



Site site #1 | Polarization: *Vertical* | Temperature: 26

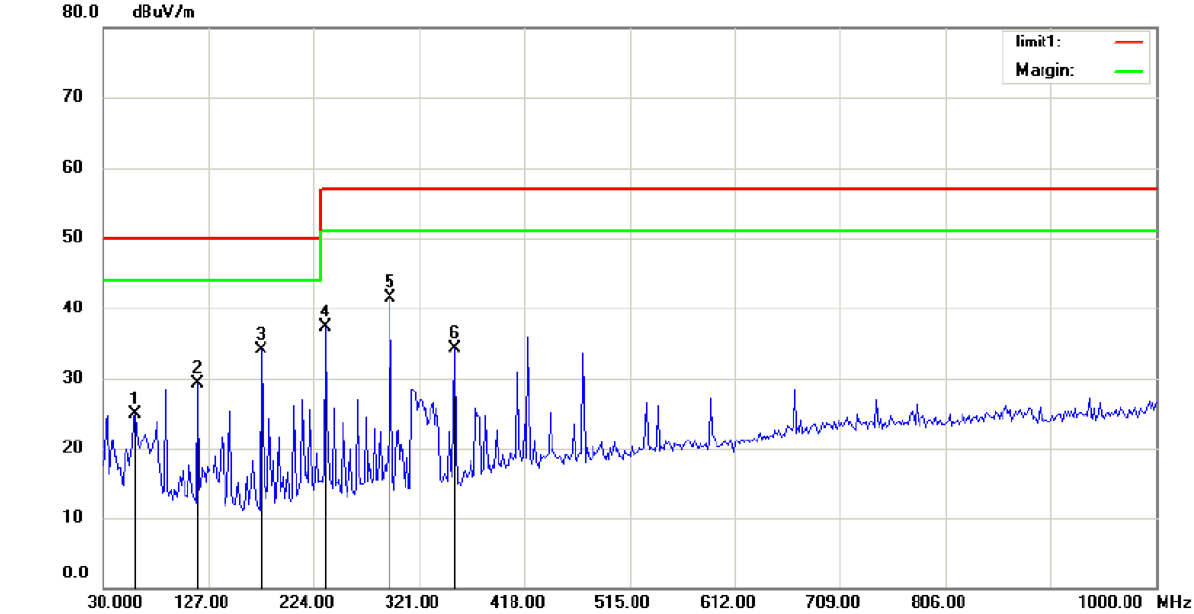
Limit: (RE)EN55022 class A | Power: AC 230V/50Hz | Humidity: 60 %

Mode:FULL LOAD

Note: LINE MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	31.5545	22.40	14.02	36.42	50.00	-13.58	QP			
2		39.3270	21.40	14.14	35.54	50.00	-14.46	QP			
3		87.5160	19.60	11.62	31.22	50.00	-18.78	QP			
4		176.1218	23.00	10.28	33.28	50.00	-16.72	QP			
5		235.1922	18.48	13.45	31.93	57.00	-25.07	QP			
6		294.2628	19.11	13.74	32.85	57.00	-24.15	QP			

*:Maximum data   x:Over limit   !:over margin   Operator: KL



Site site #1 Polarization: *Horizontal* Temperature: 26

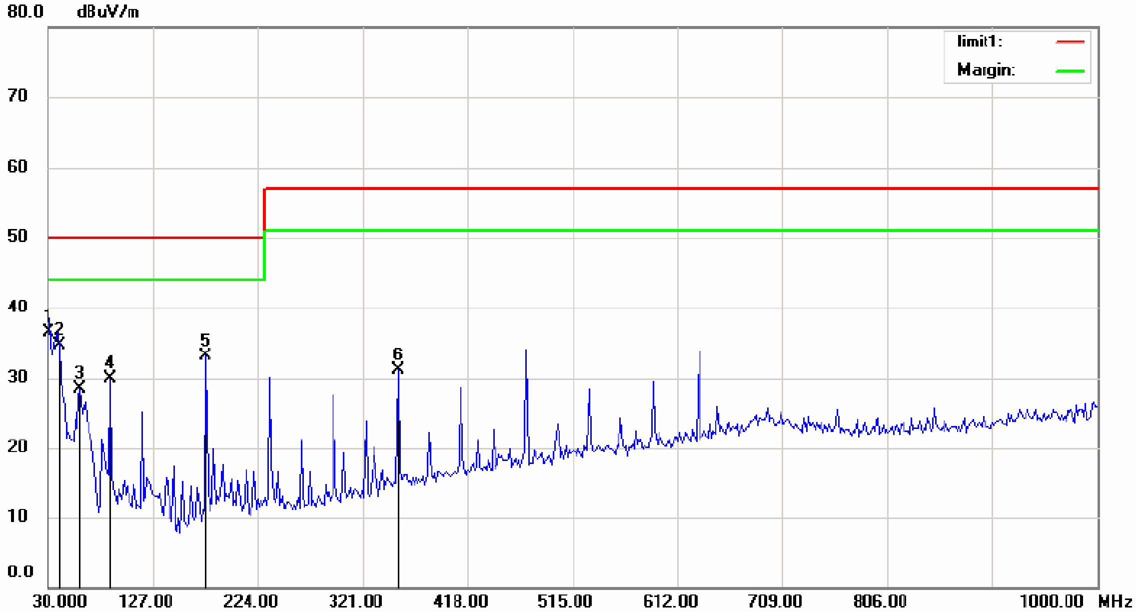
Limit: (RE)EN55022 class A Power: AC 230V/50Hz Humidity: 60 %

Mode:FULL LOAD

Note: LINE MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		59.5352	11.65	13.19	24.84	50.00	-25.16	QP			
2		117.0511	17.87	11.48	29.35	50.00	-20.65	QP			
3		176.1217	24.04	10.09	34.13	50.00	-15.87	QP			
4		235.1922	24.39	12.84	37.23	57.00	-19.77	QP			
5	*	294.2628	27.63	13.95	41.58	57.00	-15.42	QP			
6		353.3333	18.45	15.80	34.25	57.00	-22.75	QP			

*:Maximum data x:Over limit !:over margin Operator: KL



Site site #1 Polarization: **Vertical** Temperature: 26

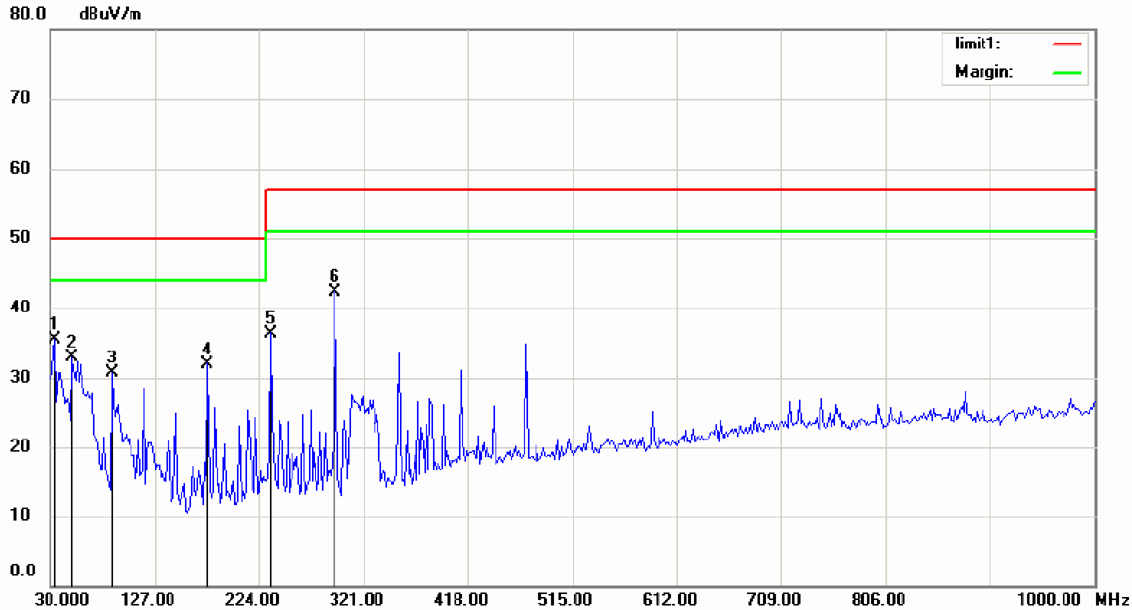
Limit: (RE)EN55022 class A Power: AC 230V/50Hz Humidity: 60 %

Mode:FULL LOAD

Note: BAT MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		cm	degree	
1	*	31.5544	22.50	14.02	36.52	50.00	-13.48	QP			
2		39.3270	20.60	14.14	34.74	50.00	-15.26	QP			
3		59.5352	15.25	13.18	28.43	50.00	-21.57	QP			
4		87.5160	18.33	11.62	29.95	50.00	-20.05	QP			
5		176.1217	22.86	10.28	33.14	50.00	-16.86	QP			
6		353.3333	15.17	16.01	31.18	57.00	-25.82	QP			

*:Maximum data x:Over limit !:over margin Operator: KL



Site site #1 | Polarization: *Horizontal* | Temperature: 26

Limit: (RE)EN55022 class A | Power: AC 230V/50Hz | Humidity: 60 %

Mode:FULL LOAD

Note: BAT MODE

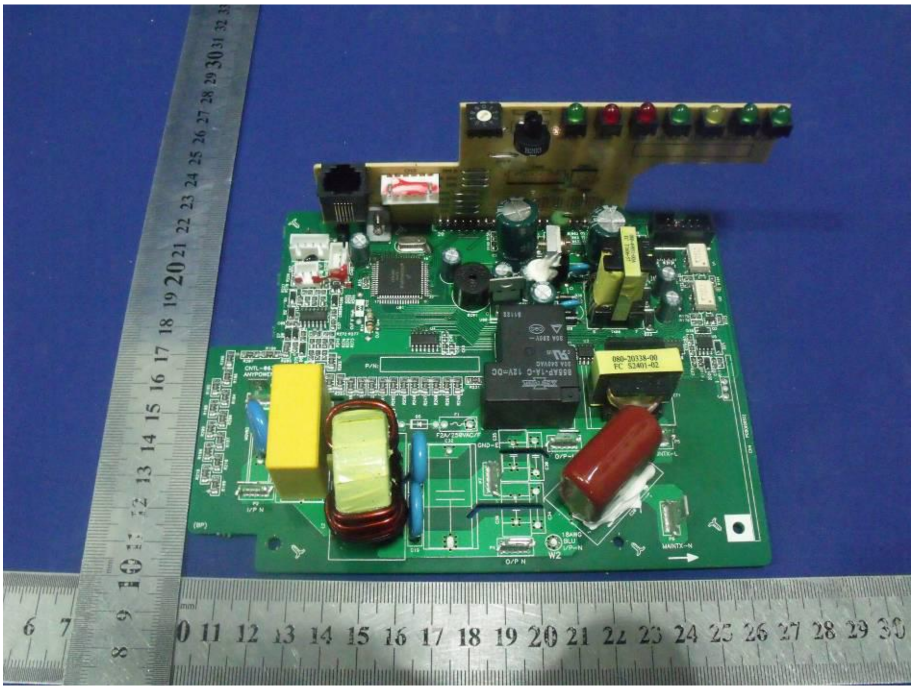
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	34.6634	21.32	14.22	35.54	50.00	-14.46	QP			
2		50.2083	19.09	13.72	32.81	50.00	-17.19	QP			
3		87.5160	19.07	11.62	30.69	50.00	-19.31	QP			
4		176.1217	21.90	10.09	31.99	50.00	-18.01	QP			
5		235.1923	23.50	12.84	36.34	57.00	-20.66	QP			
6		294.2628	28.40	13.95	42.35	57.00	-14.65	QP			

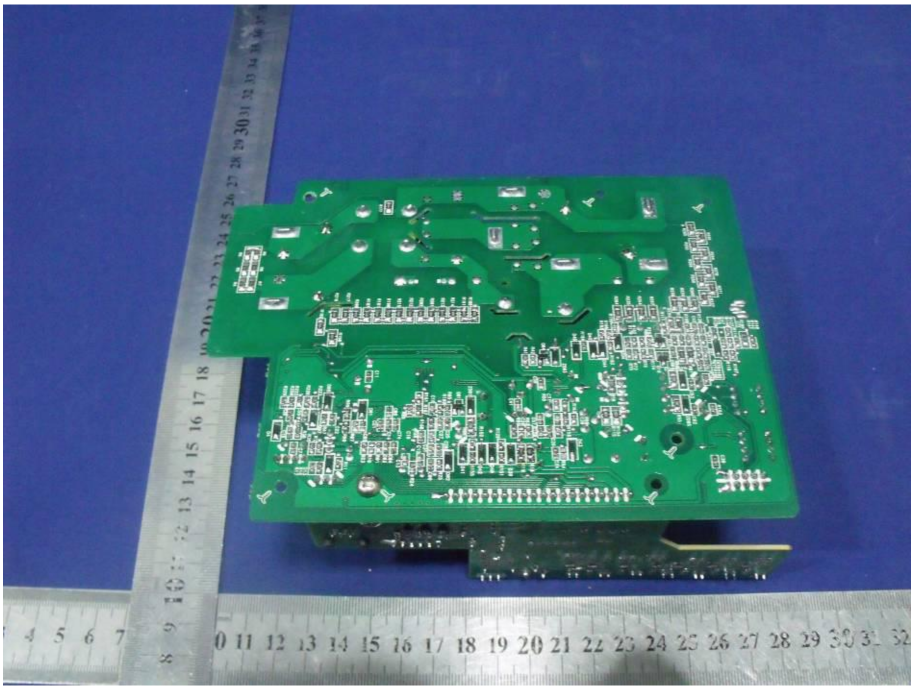
*:Maximum data x:Over limit !:over margin Operator: KL

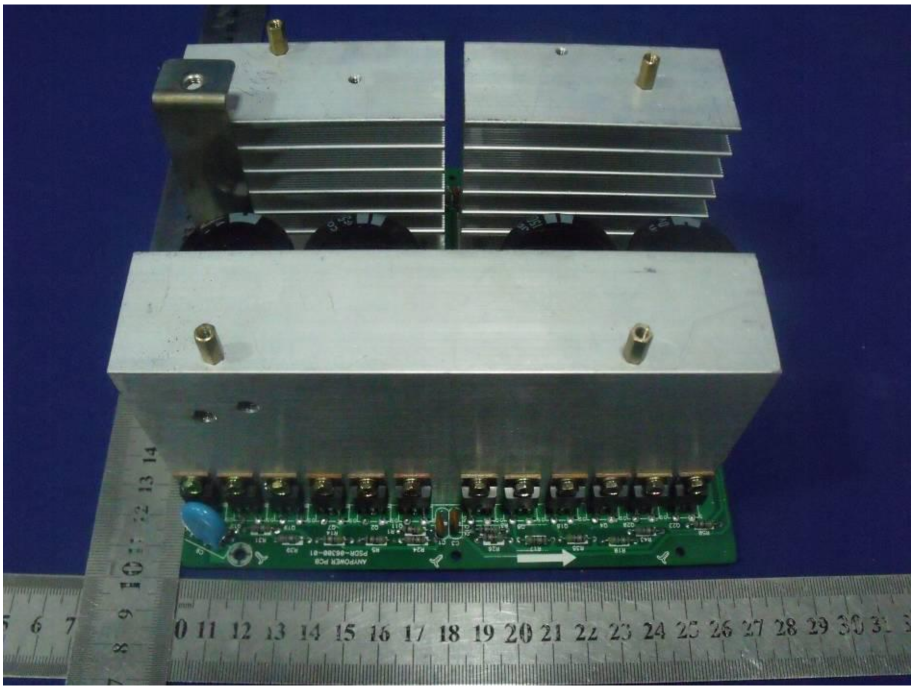
APPENDIX III
(PHOTOS OF EUT)

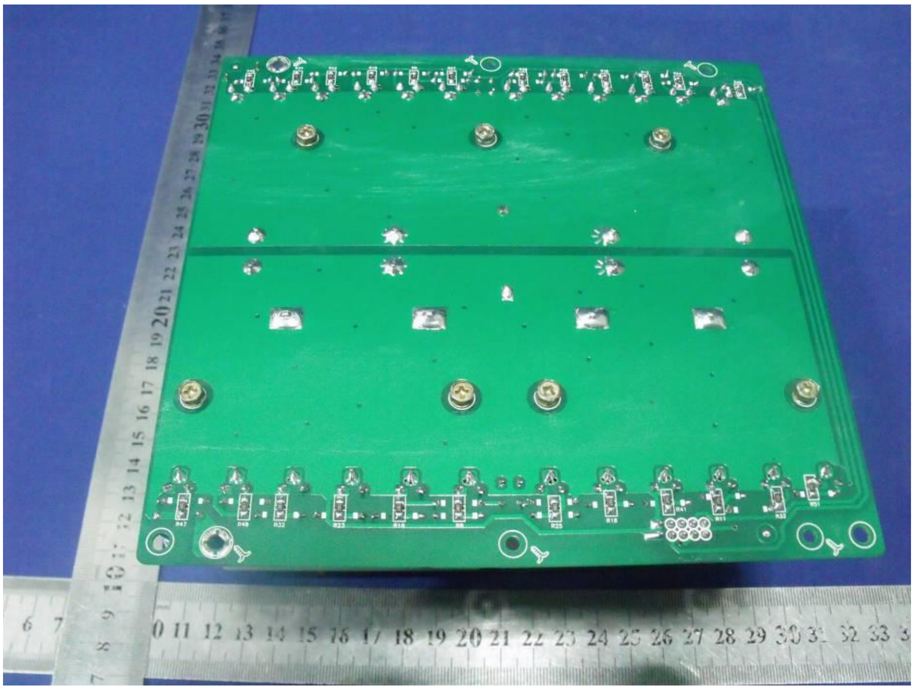
FIGURE 1
GENERAL APPEARANCE OF EUT

M/N: APC6024E









CNAS L2291

EMC TEST REPORT
for
Tortech Pty Ltd

Inverter
Model No.: APC2048E, APC3048E, APC4048E, APC5048E, APC6048E

Prepared by	:	Shenzhen EMTEK Co., Ltd
Address	:	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China Tel: (0755) 26954280 Fax: (0755) 26954282

Report Number	:	ES111008007E
Date of Test	:	October 08, 2011 to October 15, 2011
Date of Report	:	October 15, 2011

TABLE OF CONTENT

TEST REPORT DESCRIPTION

Applicant : Tortech Pty Ltd

EUT : Inverter

Model No. : APC2048E, APC3048E, APC4048E, APC5048E, APC6048E

Measurement Procedure Used:
EN55022: 2006+A1:2007,
EN 61000-3-2:2006+A1:2009+A2:2009
EN 61000-3-3:2008
EN55024: 1998+A1: 2001+A2: 2003
(EN61000-4-2: 2009, EN61000-4-3: 2006+A1:2008+A2:2010, EN61000-4-4: 2004+A1:2010, EN61000-4-5: 2006, EN61000-4-6: 2009, EN61000-4-8: 2010, EN61000-4-11: 2004)

The device described above is tested by SHENZHEN EMTEK CO., LTD. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and SHENZHEN EMTEK CO., LTD. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN55022, EN61000-3-2, EN61000-3-3 and EN55024 requirements.
This report applies to above tested sample only and shall not be reproduced in part without written approval of SHENZHEN EMTEK CO., LTD.

Date of Test : October 08, 2011 to October 15, 2011

Prepared by :

(Engineer)

Reviewer :

(Project Manager)

SHENZHEN EMTEK CO., LTD. TESTING

Approved & Authorized Signer:

(Manager)

1. SUMMARY OF TEST RESULT

EMISSION			
Description of test item	Standard	Limits	Results
Conducted disturbance at mains terminals	EN55022: 2006+A1: 2007	Class A	Pass
Radiated Disturbance	EN55022: 2006+A1: 2007	Class A	Pass
Harmonic current emissions	EN61000-3-2:2006+A1: 2009+A2:2009	Class A	Pass
Voltage fluctuation and flicker	EN61000-3-3:2008	Section 5	Pass
Immunity			
Description of test item	Basic Standard	Performance Criteria	Results
Electrostatic Discharge (ESD)	EN61000-4-2: 2009	B	Pass
Radio-frequency, Continuous radiated disturbance	EN61000-4-3: 2006+A1:2008+A2:2010	A	Pass
EFT/B Immunity	EN61000-4-4: 2004+A1:2010	B	Pass
Surge Immunity	EN61000-4-5: 2006	B	Pass
Conducted RF Immunity	EN61000-4-6: 2009	A	Pass
Power frequency magnetic field	EN61000-4-8: 2010	A	Pass
Voltage dips, >95% reduction	EN61000-4-11:2004	B	Pass
Voltage dips, 30% reduction		C	Pass
Voltage interruptions		C	Pass
Note: N/A is an abbreviation for Not Applicable.			

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT : Inverter

Model Number : APC2048E, APC3048E, APC4048E, APC5048E, APC6048E
(Note: This series of Inverter generally uses the same circuit diagrams. Unless otherwise specified, the tests are conducted on model APC6048E.)

Input and Output : For model APC2048E:
INPUT: 220~240VAC, 50/60Hz, 10A MAX, 1Ø
OUTPUT: 220~240VAC, 50/60Hz, 2000W, 1Ø
BATTERY: 48VDC
For model APC3048E:
INPUT: 220~240VAC, 50/60Hz, 30A MAX, 1Ø
OUTPUT: 220~240VAC, 50/60Hz, 3000W, 1Ø
BATTERY: 48VDC
For model APC4048E:
INPUT: 220~240VAC, 50/60Hz, 30A MAX, 1Ø
OUTPUT: 220~240VAC, 50/60Hz, 4000W, 1Ø
BATTERY: 48VDC
For model APC5048E:
INPUT: 220~240VAC, 50/60Hz, 30A MAX, 1Ø
OUTPUT: 220~240VAC, 50/60Hz, 5000W, 1Ø
BATTERY: 48VDC
For model APC6048E:
INPUT: 220~240VAC, 50/60Hz, 30A MAX, 1Ø
OUTPUT: 220~240VAC 50/60Hz, 6000W, 1Ø
BATTERY: 48VDC

Test Voltage : AC230V/50Hz

Date of receiver : October 08, 2011

Date of Test : October 08, 2011 to October 15, 2011

2.2. Description of Test Facility

Site Description		
EMC Lab.	:	Accredited by CNAS, 2010.10.29 The certificate is valid until 2013.10.28 The Laboratory has been assessed and proved to be in compliance with CNAS-CL01: 2006(identical to ISO/IEC17025: 2005) The Certificate Registration Number is L2291 Accredited by TUV Rheinland Shenzhen, 2010.5 The Laboratory has been assessed according to the requirements ISO/IEC 17025. Accredited by FCC, October 28, 2010 The Certificate Registration Number is 406365. Accredited by Industry Canada, March 5, 2010 The Certificate Registration Number is 46405-4480
Name of Firm	:	SHENZHEN EMTEK CO., LTD
Site Location	:	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

2.3. Measurement Uncertainty

Radiation Emission Uncertainty	:	3.3dB (3m Chamber)
Conduction Emission Uncertainty	:	2.6dB

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1. For Power Line Conducted Emission

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCS30	828985/018	May 29, 2011	1 Year
2.	L.I.S.N.	Schwarzbeck	NNLK8129	8129203	May 29, 2011	1 Year
3.	50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
4.	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	May 29, 2011	1 Year
5.	Voltage Probe	Rohde & Schwarz	TK9416	N/A	May 29, 2011	1 Year
6.	I.S.N	Rohde & Schwarz	ENY22	1109.9508.02	May 29, 2011	1 Year

3.2. For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 29, 2011	1 Year
2.	Pre-Amplifier	HP	8447D	2944A07999	May 29, 2011	1 Year
3.	Bilog Antenna	Schwarzbeck	VULB9163	142	May 29, 2011	1 Year
4.	Loop Antenna	ARA	PLA-1030/B	1029	May 29, 2011	1 Year
5.	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	May 29, 2011	1 Year
6.	Horn Antenna	Schwarzbeck	BBHA 9120	D143	May 29, 2011	1 Year
7.	Cable	Schwarzbeck	AK9513	ACRX1	May 29, 2011	1 Year
8.	Cable	Rosenberger	N/A	FP2RX2	May 29, 2011	1 Year
9.	Cable	Schwarzbeck	AK9513	CRPX1	May 29, 2011	1 Year
10.	Cable	Schwarzbeck	AK9513	CRRX2	May 29, 2011	1 Year

3.3. For Harmonic Current / Flicker Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	AC Power Source	California Instruments	5001iX-CTS-400-413	72795	May 29, 2011	1 Year
2.	PC	N/A	P2L97	N/A	May 29, 2011	N/A

3.4. For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	TESEQ AG	NSG 437	000409	May 29, 2011	1 Year

3.5. For RF Strength Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Power Meter. Dual Channel	BOONTON	4232A	10539	May 29, 2011	1 Year
2.	50ohm Diode Power Sensor	BOONTON	51011EMC	34236/34238	May 29, 2011	1 Year
3.	Broad-Band Horn Antenna	SCHWARZBECK	BBHA 9120 L3F	332	May 29, 2011	1 Year
4.	Power Amplifier	PRANA	AP32MT215	N/A	May 29, 2011	1 Year
5.	Power Amplifier	MILMEGA	AS0102-55	N/A	May 29, 2011	1 Year
6.	Signal Generator	AEROFLEX	2023B	N/A	May 29, 2011	1 Year
7.	Field Strength Meter	HOLADAY	HI-6005	N/A	May 29, 2011	1 Year
8.	RS232 Fiber Optic Modem	HOLADAY	HI-4413P	N/A	May 29, 2011	1 Year
9.	Log.-Per. Antenna	SCHWARZBECK	VULP 9118E	N/A	May 29, 2011	1 Year

3.6. For Electrical Fast Transient /Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Burst Tester	HAEFELY	PEFT4010	080981-16	May 29, 2011	1Year
2.	Coupling Clamp	HAEFELY	IP-4A	147147	May 29, 2011	1Year

3.7. For Surge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Surge Controller	HAEFELY	Psurge 8000	174031	May 29, 2011	1Year
2.	Impulse Module	HAEFELY	PIM 100	174124	May 29, 2011	1Year
3.	Coupling Decoupling Filter	HAEFELY	PCD 130	172181	May 29, 2011	1Year
4.	Coupling Module	HAEFELY	PCD122	174354	May 29, 2011	1Year
5.	Surge Impulse Module	HAEFELY	PIM 120	174435	May 29, 2011	1Year
6.	Coupling Module	HAEFELY	PCD 126A	174387	May 29, 2011	1Year
7.	Impulse Module	HAEFELY	PIM 110	174391	May 29, 2011	1Year

3.8. For Injected Current Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Simulator	EMTEST	CWS500C	0900-12	May 29, 2011	1Year
2.	CDN	EMTEST	CDN-M2	5100100100	May 29, 2011	1Year
3.	CDN	EMTEST	CDN-M3	0900-11	May 29, 2011	1Year
4.	Injection Clamp	EMTEST	F-2031-23 MM	368	May 29, 2011	1Year
5.	Attenuator	EMTEST	ATT6	0010222A	May 29, 2011	1Year

3.9. For Magnetic Field Immunity Test

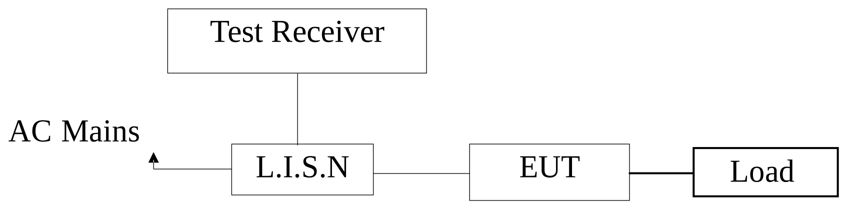
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Magnetic Field Tester	HAEFELY	MAG100	250040.1	May 29, 2011	1Year

3.10. For Voltage Dips and Interruptions Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Dips Tester	HAEFELY	Pline1610	083732-12	May 29, 2011	1Year

4. POWER LINE CONDUCTED EMISSION MEASUREMENT

4.1.Block Diagram of Test Setup



(EUT: Inverter)

4.2.Measuring Standard

EN 55022:2006+A1:2007

Power Line Conducted Emission Limits (Class A)

Frequency (MHz)	Limit (dBμV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	79	66
0.50 ~ 30.00	73	60
NOTE1-The lower limit shall apply at the transition frequencies.		

4.3.EUT Configuration on Measurement

The following equipments are installed on Conducted Emission Measurement to meet EN 55022 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

4.4. Operating Condition of EUT

4.4.1.Setup the EUT as shown on Section 4.1.

4.4.2.Turn on the power of all equipments.

4.4.3.Let the EUT work in measuring mode (Full Load) and measure it.

4.5.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided 50ohm-coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN 55022 regulations during conducted emission measurement.
The bandwidth of the field strength meter (R&S Test Receiver ESCS30) is set at 9KHz in 150KHz~30MHz and 200Hz in 9KHz~150KHz.
The frequency range from 150kHz to 30MHz is investigated
All the scanning waveforms are put in Appendix I.

4.6 Measuring Results

PASS.

Please reference to Appendix I.

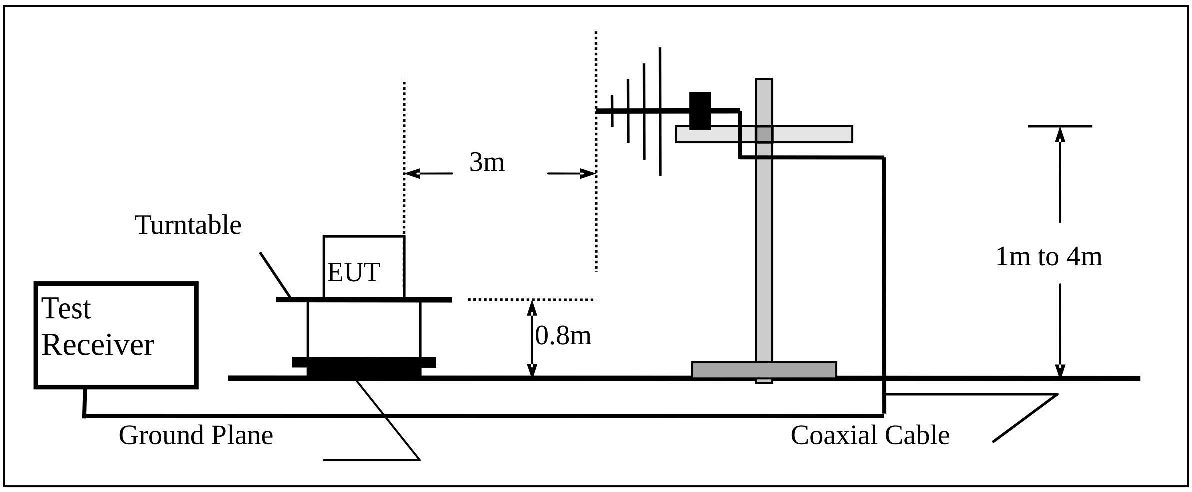
5. RADIATED EMISSION MEASUREMENT

5.1.Block Diagram of Test

5.1.1.Block diagram of connection between the EUT and simulators

(EUT: Inverter)

5.1.2.Block diagram of test setup (In chamber)



(EUT: Inverter)

5.2.Measuring Standard

EN55022: 2006+A1:2007

5.3.Radiated Emission Limits

All emanations from a class A device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dBμV/m)
30 ~ 230	3	50
230 ~ 1000	3	57

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

5.4.EUT Configuration on Test

The EN55022 regulations test method must be used to find the maximum emission during radiated emission measurement.

5.5.Operating Condition of EUT

5.5.1.Turn on the power.

5.5.2.After that, let the EUT work in test mode (Full Load) and measure it.

5.6.Test Procedure

The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

The bandwidth of the Receiver (ESU26) is set at 120kHz.
All the scanning curves are attached in Appendix II.

5.7.Measuring Results

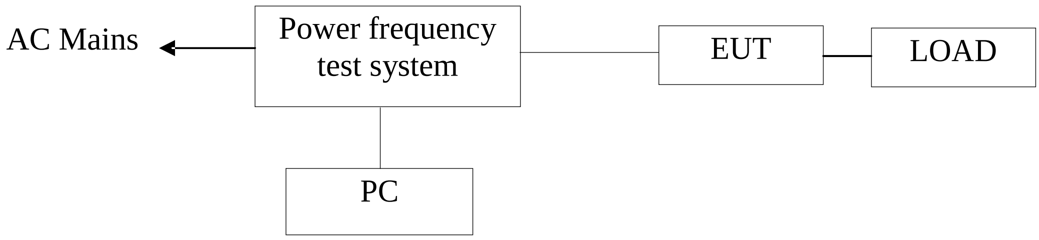
PASS.

The frequency range from 30MHz to 1000MHz is investigated.

Please reference to Appendix II.

6. HARMONIC CURRENT EMISSION MEASUREMENT

6.1 Block Diagram of Test Setup



(EUT: Inverter)

6.2 Measuring Standard

EN 61000-3-2:2006+A1:2009+A2:2009

6.3 Operation Condition of EUT

Same as Section 4.4, except the test setup replaced as Section 6.1.

6.4 Measuring Results

PASS.

Please refer to the following pages.

Test Report

Report title:	HARMONICS
Company Name:	EMTEK
Date of test:	16:28 10.Oct 2011
Measurement file name:	Harmonics_3_2_Ed3 2.rsd
Tester:	JLH
Standard used:	EN/IEC 61000-3-2 Ed.3 Short cyclic Equipment class A <= 200% of the limit
Observation time:	150s
Windows width:	10 periods - (EN/IEC 61000-4-7 Edition 2002)
E. U. T.:	Inverter
MN:	APC6048E

Test Result	
E. U. T.:	PASS
Power Source:	PASS

E. U. T. Result

Harmonic(s) > 200%:		
	Order (n):	None
Harmonic(s) with average > 90%:		
	Order (n):	None
Harmonic(s) between 150% and 200% during more than 10% of the test time or max. 10min:		
	Order (n):	None

Power Source Result

First dataset out of limit:		
	DS (time):	None
Harmonic(s) out of limit:		
	Order (n):	None

Average harmonic current results

Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
1	5.180	100.000		
2	46.486E-3	0.897	972.00E-3	PASS
3	241.257E-3	4.657	2.07	PASS
4	7.183E-3	0.139	387.00E-3	PASS
5	232.860E-3	4.495	1.03	PASS
6	12.932E-3	0.250	270.00E-3	PASS
7	140.744E-3	2.717	693.00E-3	PASS
8	7.403E-3	0.143	207.00E-3	PASS
9	76.860E-3	1.484	360.00E-3	PASS
10	9.504E-3	0.183	165.60E-3	PASS
11	68.788E-3	1.328	297.00E-3	PASS
12	5.506E-3	0.106	138.00E-3	PASS
13	39.077E-3	0.754	189.00E-3	PASS
14	4.819E-3	0.093	118.29E-3	PASS
15	30.877E-3	0.596	135.00E-3	PASS
16	3.629E-3	0.070	103.50E-3	PASS
17	27.732E-3	0.535	119.11E-3	PASS
18	3.561E-3	0.069	92.00E-3	PASS
19	15.134E-3	0.292	106.58E-3	PASS
20	2.650E-3	0.051	82.80E-3	PASS
21	16.533E-3	0.319	96.43E-3	PASS
22	2.899E-3	0.056	75.28E-3	PASS
23	15.569E-3	0.301	88.05E-3	PASS
24	3.309E-3	0.064	68.99E-3	PASS
25	11.982E-3	0.231	81.00E-3	PASS
26	2.869E-3	0.055	63.69E-3	PASS
27	12.240E-3	0.236	75.00E-3	PASS
28	3.176E-3	0.061	59.14E-3	PASS
29	13.911E-3	0.269	69.83E-3	PASS
30	3.789E-3	0.073	55.20E-3	PASS
31	11.621E-3	0.224	65.32E-3	PASS
32	3.739E-3	0.072	51.75E-3	PASS
33	11.636E-3	0.225	61.36E-3	PASS
34	4.000E-3	0.077	48.71E-3	PASS
35	12.365E-3	0.239	57.86E-3	PASS
36	4.414E-3	0.085	46.00E-3	PASS
37	9.799E-3	0.189	54.73E-3	PASS
38	5.938E-3	0.115	43.58E-3	PASS
39	8.287E-3	0.160	51.92E-3	PASS
40	7.109E-3	0.137	41.40E-3	PASS

Maximum harmonic current results

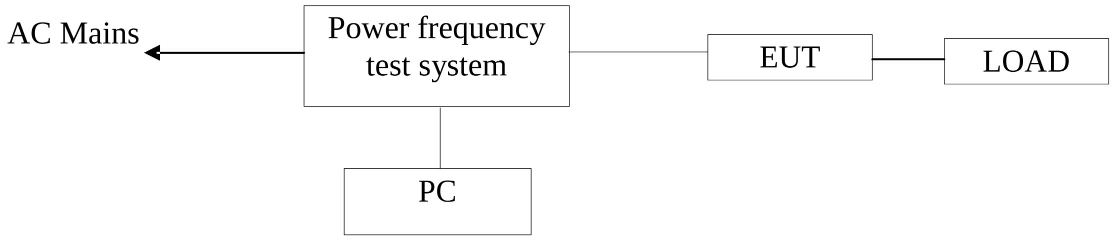
Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
1	5.616	100.000		
2	70.177E-3	1.250	2.16	PASS
3	476.847E-3	8.491	4.60	PASS
4	14.361E-3	0.256	860.00E-3	PASS
5	427.710E-3	7.616	2.28	PASS
6	23.743E-3	0.423	600.00E-3	PASS
7	303.082E-3	5.397	1.54	PASS
8	14.505E-3	0.258	460.00E-3	PASS
9	198.286E-3	3.531	800.00E-3	PASS
10	15.588E-3	0.278	368.00E-3	PASS
11	163.073E-3	2.904	660.00E-3	PASS
12	9.587E-3	0.171	306.66E-3	PASS
13	105.983E-3	1.887	420.00E-3	PASS
14	7.858E-3	0.140	262.86E-3	PASS
15	69.991E-3	1.246	300.00E-3	PASS
16	6.146E-3	0.109	230.00E-3	PASS
17	56.015E-3	0.997	264.70E-3	PASS
18	5.473E-3	0.097	204.44E-3	PASS
19	29.853E-3	0.532	236.84E-3	PASS
20	3.937E-3	0.070	184.00E-3	PASS
21	27.342E-3	0.487	214.28E-3	PASS
22	4.327E-3	0.077	167.28E-3	PASS
23	28.115E-3	0.501	195.66E-3	PASS
24	4.715E-3	0.084	153.32E-3	PASS
25	27.465E-3	0.489	180.00E-3	PASS
26	4.861E-3	0.087	141.54E-3	PASS
27	30.417E-3	0.542	166.66E-3	PASS
28	4.622E-3	0.082	131.42E-3	PASS
29	35.058E-3	0.624	155.18E-3	PASS
30	4.898E-3	0.087	122.66E-3	PASS
31	28.035E-3	0.499	145.16E-3	PASS
32	5.512E-3	0.098	115.00E-3	PASS
33	28.906E-3	0.515	136.36E-3	PASS
34	5.372E-3	0.096	108.24E-3	PASS
35	29.808E-3	0.531	128.58E-3	PASS
36	6.195E-3	0.110	102.22E-3	PASS
37	17.606E-3	0.314	121.62E-3	PASS
38	7.946E-3	0.141	96.84E-3	PASS
39	18.414E-3	0.328	115.38E-3	PASS
40	11.488E-3	0.205	92.00E-3	PASS

Maximum harmonic voltage results

Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	230.57	100.247		
2	44.68E-3	0.019	0.2	PASS
3	216.73E-3	0.094	0.9	PASS
4	45.62E-3	0.020	0.2	PASS
5	104.31E-3	0.045	0.4	PASS
6	39.78E-3	0.017	0.2	PASS
7	99.79E-3	0.043	0.3	PASS
8	30.31E-3	0.013	0.2	PASS
9	117.81E-3	0.051	0.2	PASS
10	24.63E-3	0.011	0.2	PASS
11	51.47E-3	0.022	0.1	PASS
12	12.88E-3	0.006	0.1	PASS
13	82.41E-3	0.036	0.1	PASS
14	18.64E-3	0.008	0.1	PASS
15	68.96E-3	0.030	0.1	PASS
16	27.43E-3	0.012	0.1	PASS
17	67.64E-3	0.029	0.1	PASS
18	20.84E-3	0.009	0.1	PASS
19	65.38E-3	0.028	0.1	PASS
20	28.36E-3	0.012	0.1	PASS
21	72.46E-3	0.032	0.1	PASS
22	21.80E-3	0.009	0.1	PASS
23	53.59E-3	0.023	0.1	PASS
24	29.27E-3	0.013	0.1	PASS
25	42.13E-3	0.018	0.1	PASS
26	28.49E-3	0.012	0.1	PASS
27	54.92E-3	0.024	0.1	PASS
28	26.61E-3	0.012	0.1	PASS
29	60.64E-3	0.026	0.1	PASS
30	32.19E-3	0.014	0.1	PASS
31	56.12E-3	0.024	0.1	PASS
32	32.72E-3	0.014	0.1	PASS
33	46.87E-3	0.020	0.1	PASS
34	33.33E-3	0.014	0.1	PASS
35	73.68E-3	0.032	0.1	PASS
36	29.35E-3	0.013	0.1	PASS
37	61.35E-3	0.027	0.1	PASS
38	37.15E-3	0.016	0.1	PASS
39	40.07E-3	0.017	0.1	PASS
40	41.62E-3	0.018	0.1	PASS

7. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

7.1Block Diagram of Test Setup



(EUT: Inverter)

7.2Measuring Standard

EN 61000-3-3: 2008

7.3Operation Condition of EUT

Same as Section 4.4, except the test setup replaced as Section 7.1.

7.4Measuring Results

PASS.

Please see the attached pages.

Test Report

Report title:	FLICKER
Company Name:	EMTEK
Date of test:	13:36 10.Oct 2011
Tester:	KL
Standard used:	EN/IEC 61000-3-3 Flicker
Short time (Pst):	10 min
Observation time:	10 min (1 Flicker measurement)
Flickermeter:	230V / 50Hz
Flicker Impedance:	Zref (IEC 60725)
E. U. T.:	Inverter
M/N:	APC6048E

Test Result	PASS

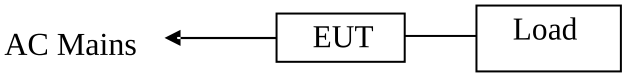
Maximum Flicker results

	EUT values	Limit	Result
Pst	0.300	1.00	PASS
dc [%]	0.903	3.30	PASS
dmax [%]	1.428	4.00	PASS
dt [s]	0.000	0.50	PASS

8. ELECTROSTATIC DISCHARGE IMMUNITY TEST

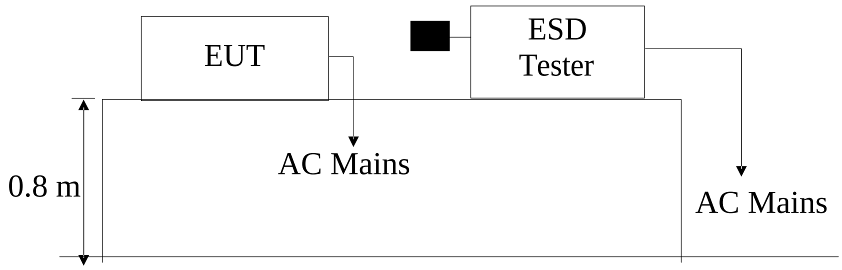
8.1 Block Diagram of Test Setup

8.1.1 Block diagram of connection between the EUT and simulators



(EUT: Inverter)

8.1.2 Block diagram of ESD test setup



(EUT: Inverter)

8.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-2: 2009
Severity Level: 3 / Air Discharge: ±8KV Level: 2 / Contact Discharge: ±4KV)

8.3 Severity Levels and Performance Criterion

8.3.1 Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	±2	±2
2.	±4	±4
3.	±6	±8
4.	±8	±15
X	Special	Special

8.3.2 Performance criterion: **B**

8.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

8.5 Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.4. Except the test set up replaced by Section 8.1.

8.6 Test Procedure

8.6.1 Air Discharge**:**

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

8.6.2 Contact Discharge**:**

All the procedure shall be same as Section 8.6.1. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

8.6.3 Indirect discharge for horizontal coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

8.6.4 Indirect discharge for vertical coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

8.7 Test Results

PASS

Please refer to the following pages

Electrostatic Discharge Test Result

SHENZHEN EMTEK CO., LTD

EUT	: Inverter	Test Date	: October 10, 2011
M/N	: APC6048E	Temperature	: 22℃
Power supply	: AC 230V/50Hz	Humidity	: 50%
Air discharge	: ±8.0KV	Test Mode	: Full Load
Contact discharge:	±4.0KV	Criterion	: B
		Test Engineer :	Zone

Location	**Kind** A-Air Discharge C-Contact Discharge	**Result**
Slot of the EUT	A	PASS
Button	A	PASS
Screw	C	PASS
Metal	C	PASS
HCP	C	PASS
VCP of front	C	PASS
VCP of rear	C	PASS
VCP of left	C	PASS
VCP of right	C	PASS

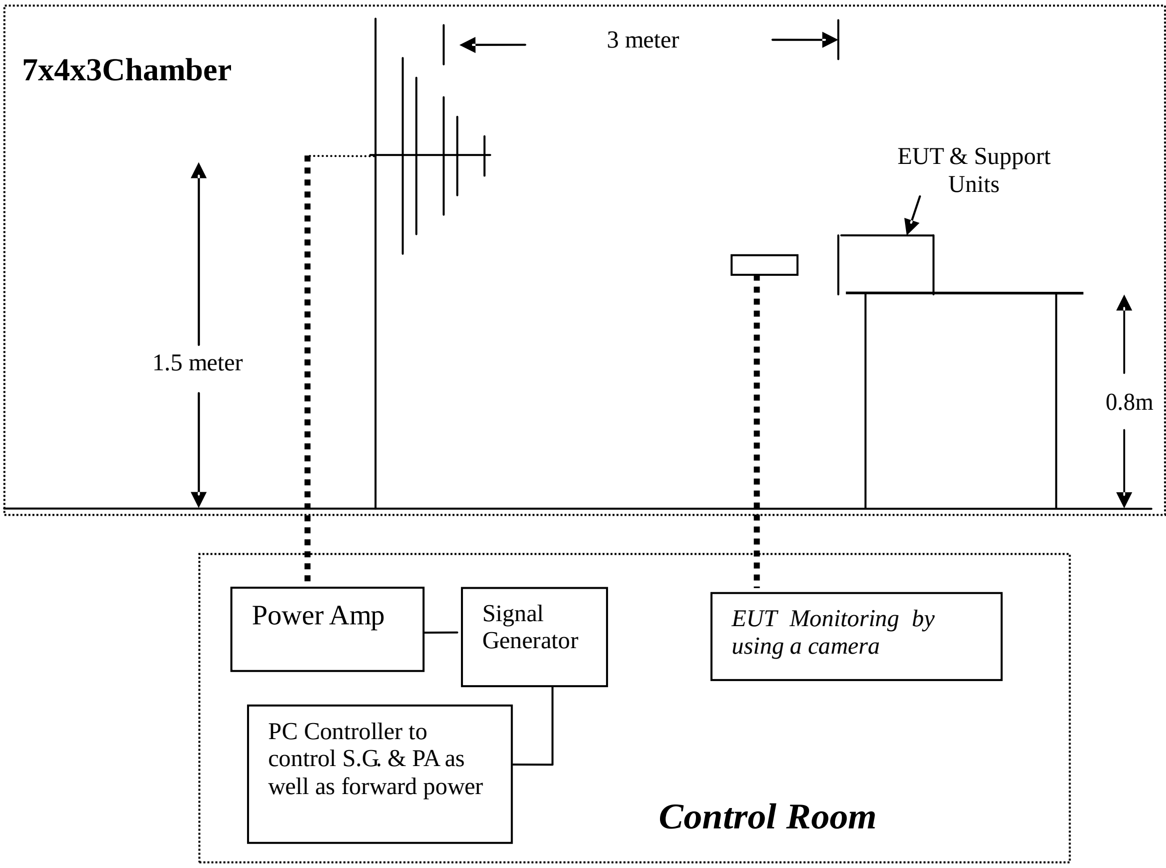
9. RF FIELD STRENGTH SUSCEPTIBILITY TEST

9.1 Block Diagram of Test

9.1.1 Block diagram of connection between the EUT and Load

(EUT: Inverter)

9.1.2 Block diagram of RS test setup



(EUT: Inverter)

9.2Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-3: 2006+A1:2008+A2:2010 (Severity Level: 2, 3V / m))

9.3 Severity Levels and Performance Criterion

9.3.1 Severity Levels

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

9.3.2 Performance Criterion : **A**

9.4 EUT Configuration on Test

The configuration of the EUT is same as Section 4.3.

9.5 Operating Condition of EUT

Same as radiated emission measurement, which is listed in Section 4.4, except the test setup replaced as Section 9.1.

9.6 Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.
In order to judge the EUT performance, a CCD camera is used to monitor its screen.
All the scanning conditions are as following:

Condition of Test	Remark
1. Fielded Strength	3V/m (Severity Level 2)
2. Radiated Signal	Modulated
3. Scanning Frequency	80-1000MHz
4. Sweep time of radiated	0.0015 Decade/s
5. Dwell Time	1 Sec.

9.7 Test Results

PASS.

Please refer to the following page.

RF Field Strength Susceptibility Test Results

SHENZHEN EMTEK CO., LTD.

EUT : Inverter	Test Date : October 10, 2011
M/N : APC6048E	Temperature : 22℃
Field Strength : 3V/m	Humidity : 50 ％
Power Supply : AC 230V/50Hz	Criterion : A
Test Engineer: Zone	Test Mode : Full Load
	Frequency Range: 80 MHz to 1000 MHz

Modulation: ☐None ☐ Pulse ☒AM 1KHz 80%

	Frequency Rang 1: 80~ 1000MHz		Frequency Rang 2:	
Steps	# / %		# / %	
	Horizontal	Vertical	Horizontal	Vertical
Front	PASS	PASS		
Right	PASS	PASS		
Rear	PASS	PASS		
Left	PASS	PASS		

Test Equipment **:**

1. Signal Generator : 2023B (AEROFLEX)
2. Power Amplifier : AS0102-55(MILMEGA)&AP32MT215(PRANA)
3. Log.-Per.Antenna: VULP9118E(SCHWARZBECK)
4. Broad-Band Horn Antenna: BBHA 9120L3F(SCHWARZBECK)
5. RF Power Meter. Dual Channel: 4232A(BOONTON)
6. Field Strength Meter: HI-6005(HOLADAY)

Note:

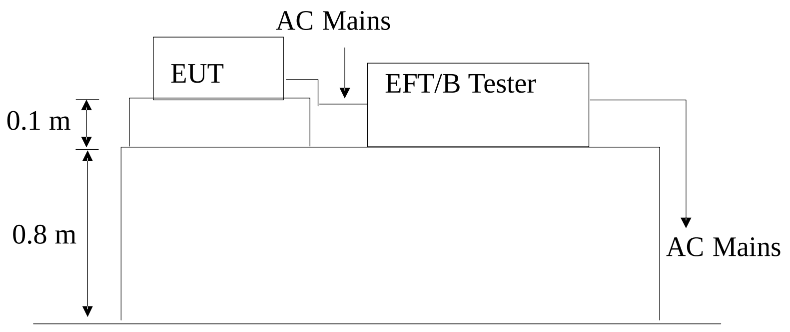
10. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

10.1 Block Diagram of Test Setup

10.1.1.Block Diagram of the EUT

(EUT: Inverter)

10.1.2.EFT Test Setup



10.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-4: 2004+A1:2010, Severity Level, Level 2**:** 1KV)

10.3 Severity Levels and Performance Criterion

10.3.1 Severity level

Open Circuit Output Test Voltage ±10%		
Level	On Inverter Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 KV	0.25 KV
2.	1 KV	0.5 KV
3.	2 KV	1 KV
4.	4 KV	2 KV
X	Special	Special

10.3.2 Performance criterion **: B**

10.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

10.5 Operating Condition of EUT

10.5.1 Setup the EUT as shown in Section 10.1.

10.5.2 Turn on the power of all equipments.

10.5.3 Let the EUT work in test mode (Full Load) and measure it.

10.6 Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

10.6.1 For input and output AC power ports**:**

The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

10.6.2 For signal lines and control lines ports**:**

No I/O ports. It's unnecessary to test.

10.6.3 For DC output line ports**:**

It's unnecessary to test.

10.7 Test Result

PASS.

Please refer to the following page.

Electrical Fast Transient/Burst Test Results

SHENZHEN EMTEK CO., LTD.

Standard	☐ IEC 61000-4-4 ☒ EN 61000-4-4	Result: ☒ PASS / ☐ FAIL

EUT : Inverter M/N : APC6048E

Input Voltage: AC 230 V 50 HZ

Criterion : B

Ambient Condition : 22 ℃ 50% RH

Operation Mode: Charging	
Line : ☒ AC Mains	Line : ☐ Signal ☐ I/O Cable
Coupling : ☒ Direct	Coupling : ☐ Capacitive
Test Time : 120s	

Line	Test Voltage	Result (+)	Result (-)
L	1KV	PASS	PASS
N	1KV	PASS	PASS
PE	1KV	PASS	PASS
L、N	1KV	PASS	PASS
L、PE	1KV	PASS	PASS
N、PE	1KV	PASS	PASS
L、N、PE	1KV	PASS	PASS
Signal Line			
DC Line			

Note:

Test Equipment	Burst Tester Model: PEFT 4010

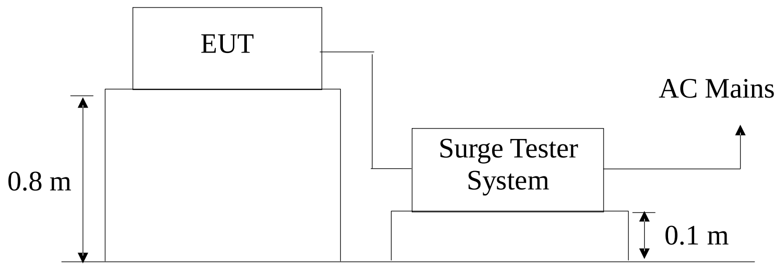
11. SURGE IMMUNITY TEST

11.1 Block Diagram of Test Setup

11.1.1 Block Diagram of the EUT

(EUT: Inverter)

11.1.2. Surge Test Setup



11.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-5: 2006)
Severity Level**:** Line to Line: Level 2, 1.0KV, Level 3**:** 2KV

11.3 Severity Levels and Performance Criterion

11.3.1.Severity level

Severity Level	Open-Circuit Test Voltage KV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

11.3.2 Performance criterion: **B**

11.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

11.5 Operating Condition of EUT

11.5.1 Setup the EUT as shown in Section 11.1.

11.5.2. Turn on the power of all equipments.

11.5.3.Let the EUT work in test mode (Full Load) and measure it.

11.6 Test Procedure

1) Set up the EUT and test generator as shown on Section 11.1.2.
2) For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge
   For line to earth coupling mode, provide a 2.0 kV 1.2/50us voltage surge.
   (at open-circuit condition) and 8/20us current surge to EUT selected points.
3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
4) Different phase angles are done individually.
5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

11.7 Test Result

PASS.

Please refer to the following page.

Surge Immunity Test Result

SHENZHEN EMTEK CO., LTD.

EUT : Inverter
M/N : APC6048E
Power Supply: AC 230V / 50Hz
Test Engineer: Zone

Test Date : October 10, 2011
Temperature : 22℃
Humidity : 50%
Test Mode : Full Load
Criterion : B

Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (KV)	Result
L-N	+	0^o	5	1.0	PASS
	+	90^o	5	1.0	PASS
	+	180^o	5	1.0	PASS
	+	270^o	5	1.0	PASS
	-	0^o	5	1.0	PASS
	-	90^o	5	1.0	PASS
	-	180^o	5	1.0	PASS
	-	270^o	5	1.0	PASS
L-PE	+	0^o	5	2.0	PASS
	+	90^o	5	2.0	PASS
	+	180^o	5	2.0	PASS
	+	270^o	5	2.0	PASS
	-	0^o	5	2.0	PASS
	-	90^o	5	2.0	PASS
	-	180^o	5	2.0	PASS
	-	270^o	5	2.0	PASS
N-PE	+	0^o	5	2.0	PASS
	+	90^o	5	2.0	PASS
	+	180^o	5	2.0	PASS
	+	270^o	5	2.0	PASS
	-	0^o	5	2.0	PASS
	-	90^o	5	2.0	PASS
	-	180^o	5	2.0	PASS
	-	270^o	5	2.0	PASS

Remark:

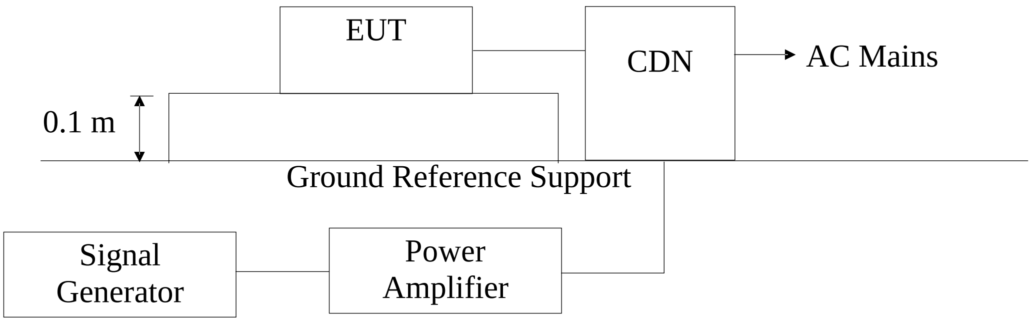
12. INJECTED CURRENTS SUSCEPTIBILITY TEST

12.1 Block Diagram of Test Setup

12.1.1 Block Diagram of the EUT

(EUT: Inverter)

12.1.2 Block Diagram of Test Setup



12.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003 (EN61000-4-6: 2009, Severity Level: Level 2, 3V (rms), (0.15MHz ~ 80MHz)

12.3 Severity Levels and Performance Criterion

12.3.1 Severity level

Level	Field Strength V
1	1
2	3
3	10
X	Special

12.3.2 Performance criterion**: A**

12.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

11.5 Operating Condition of EUT

11.5.1 Setup the EUT as shown in Section 12.1.

11.5.2 Turn on the power of all equipments.

11.5.3 Let the EUT work in test mode (Full Load) and measure it.

12.6 Test Procedure

1) Set up the EUT, CDN and test generators as shown on Section 12.1.2.
2) Let the EUT work in test mode and measure it.
3) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
4) The disturbance signal described below is injected to EUT through CDN.
5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
6) The frequency range is swept from 150KHz to80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
7) The rate of sweep shall not exceed $1.5*10^{-3}$decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

12.7Test Results

PASS.

Please refer to the following page.

Injected Currents Susceptibility Test Results

SHENZHEN EMTEK CO., LTD.

EUT : Inverter
M/N : APC6048E
Power Supply : AC 230V / 50Hz
Test Engineer : Zone

Test Date: October 10, 2011
Temperature : 22℃
Humidity : 50%

Test Mode : Full Load

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
0.15 ~ 80	AC Mains	3V	A	PASS

Test Mode:

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result

Remark : 1. Modulation Signal:1KHz 80% AM
Measurement Equipment :
Simulator: CWS 500 (SWITZERLAND EMTEST)
CDN : ☐ CDN-M2 (SWITZERLAND EMTEST)
☒ CDN-M3 (SWITZERLAND EMTEST)

Note:

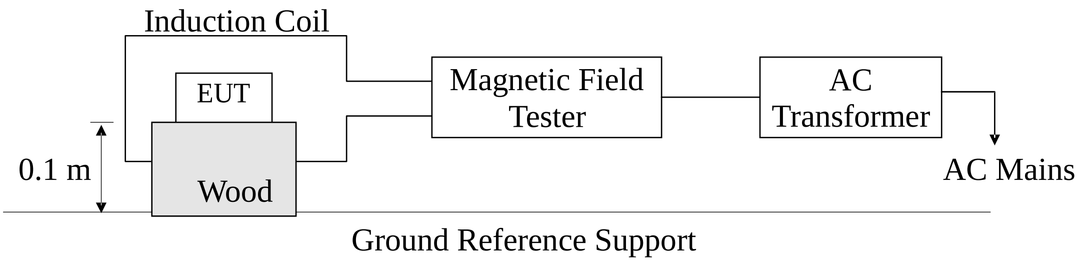
13. MAGNETIC FIELD SUSCEPTIBILITY TEST

13.1 Block Diagram of Test

13.1.1 Block diagram of test setup

(EUT: Inverter)

13.1.2 Magnetic field test setup



(EUT: Inverter)

13.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003 (EN61000-4-8: 2010, Severity Level: Level 1, 1A / m)

13.3 Severity Levels and Performance Criterion

13.3.1 Severity Levels

Level	Field Strength A/m
1	1
2	3
3	10
4	30
5	100
X	Special

13.3.2 Performance Criterion: **A**

13.4 EUT Configuration on Test

The configuration of the EUT is same as Section 4.3.

13.5 Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. The X, Y and Z polarization of the induction coil is set on test, so that each side of the EUT is affected by the magnetic field. Also can reach the same aim by change the position of the EUT.

13.6Test Results

PASS.

Please refer to the following page.

Magnetic Field Immunity Test Result

SHENZHEN EMTEK CO., LTD.

Standard	☐ IEC 61000-4-8 ☒ EN 61000-4-8	Result: ☒ Pass / ☐ Fail

EUT : Inverter M/N: APC6048E

Input Voltage : 230V 50Hz

Date of Test : October 10, 2011 Test Engineer: Zone

Ambient Condition : Temp : 22℃ Humid: 50%

Criterion : A

Operation Mode : Full Load

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result
1	5 mins	X	A	PASS
1	5 mins	Y	A	PASS
1	5 mins	Z	A	PASS

Operation Mode :

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result

Test Equipment	Magnetic Field Test : HEAFELY MAG 100.1

Note:

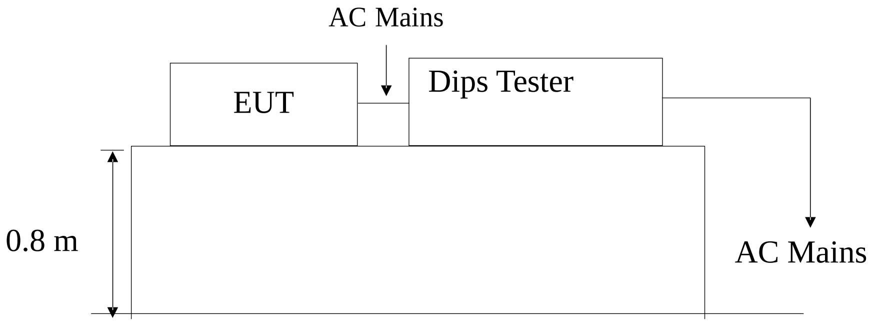
14. VOLTAGE DIPS AND INTERRUPTIONS TEST

14.1 Block Diagram of Test Setup

14.1.1 Block Diagram of the EUT

(EUT: Inverter)

14.1.2 Dips Test Setup



14.2 Test Standard

EN55024: 1998+A1: 2001+A2: 2003(EN61000-4-11: 2004)

14.3 Severity Levels and Performance Criterion

14.3.1 Severity level

Test Level %UT	Voltage dip and short interruptions %UT	Duration (in period)
0	100	0.5 1 5 10 25 50 *
40	60	
70	30	

14.3.2 Performance criterion: **B&C**

14.4 EUT Configuration

The configuration of EUT is listed in Section 4.3.

14.5 Operating Condition of EUT

14.5.1 Setup the EUT as shown in Section 14.1.

14.5.2 Turn on the power of all equipments.

14.5.3 Let the EUT work in test mode (Full Load) and measure it.

14.6 Test Procedure

1) Set up the EUT and test generator as shown on Section 14.1.2.
2) The interruption is introduced at selected phase angles with specified duration.
3) Record any degradation of performance.

14.7 Test Result

PASS.

Please refer to the following page.

Voltage Dips And Interruptions Test Results

SHENZHEN EMTEK CO., LTD.

EUT : Inverter M/N : APC6048E Power Supply : 230V / 50Hz	Test Date : October 10, 2011 Temperature : 22℃ Humidity : 50% Test Engineer : Zone

Test Mode: Full Load

Test Level % U_T	Voltage Dips & Short Interruptions % U_T	Duration (in periods)	Criterion ☐ A ☒ B ☒ C ☐ D	Result P=PASS F=Fail
0	100	0.5P	B	P
70	30	25P	C	P
0	100	250P	C	P

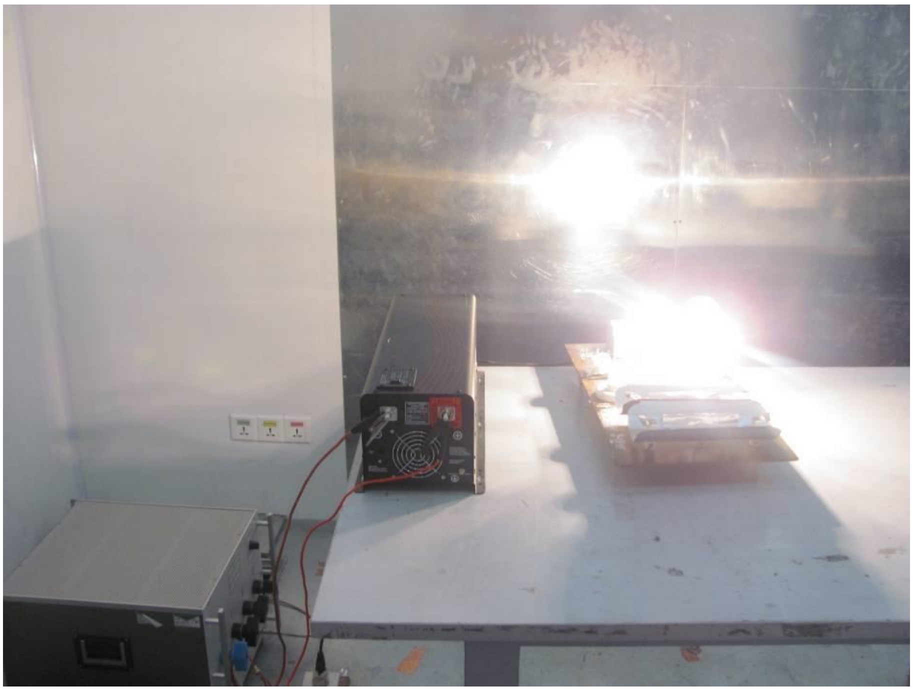
Test Mode :

Test Level % U_T	Voltage Dips & Short Interruptions % U_T	Duration (in periods)	Criterion ☐ A ☐ B ☐ C ☐ D	Result P=PASS F=FAIL

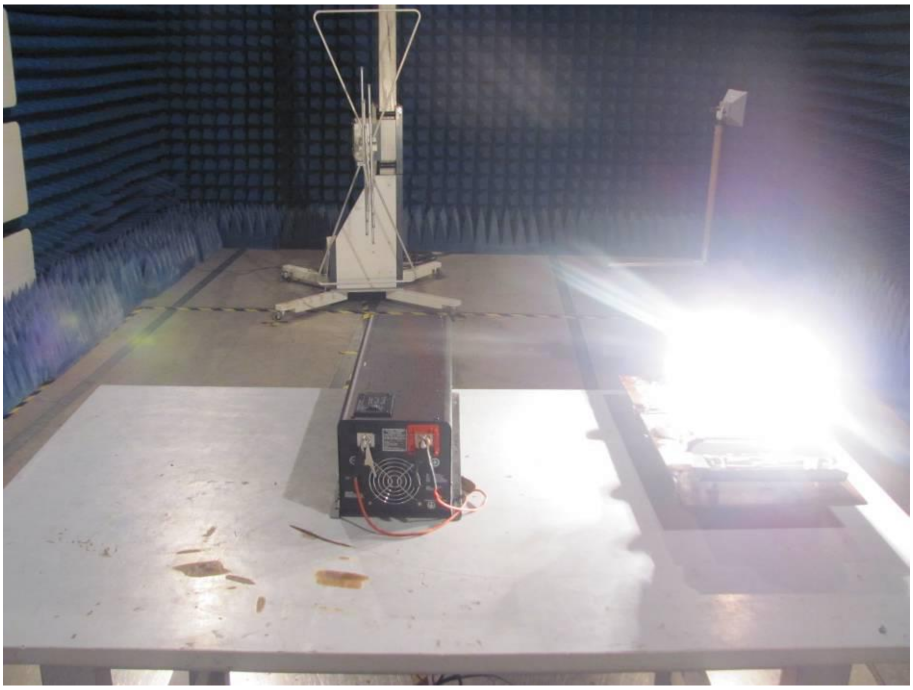
Note:

15. PHOTOGRAPH

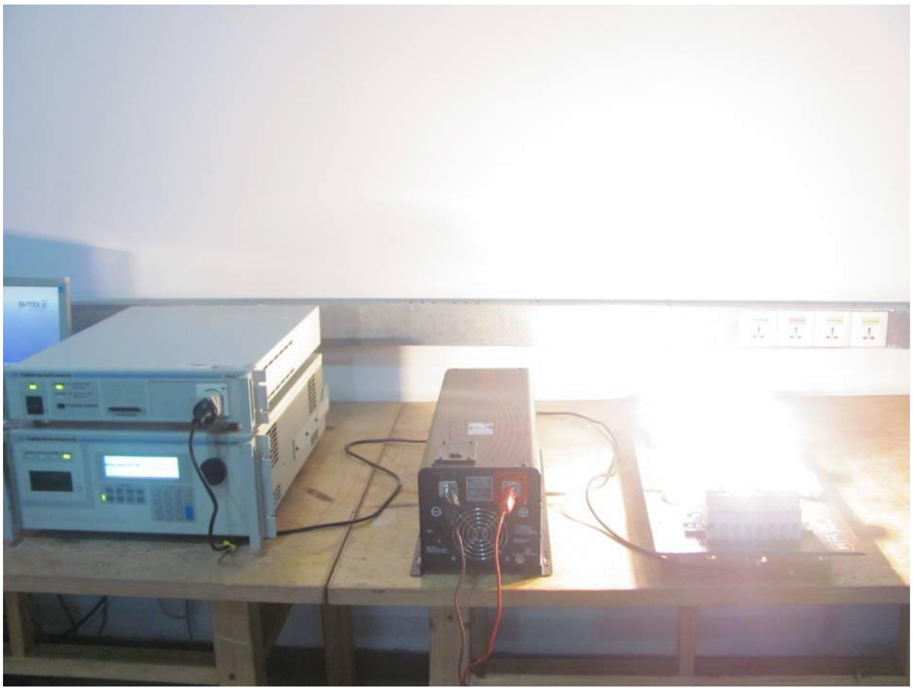
15.1 Photo of Conducted Emission Measurement



15.2 Photo of Radiation Emission Measurement

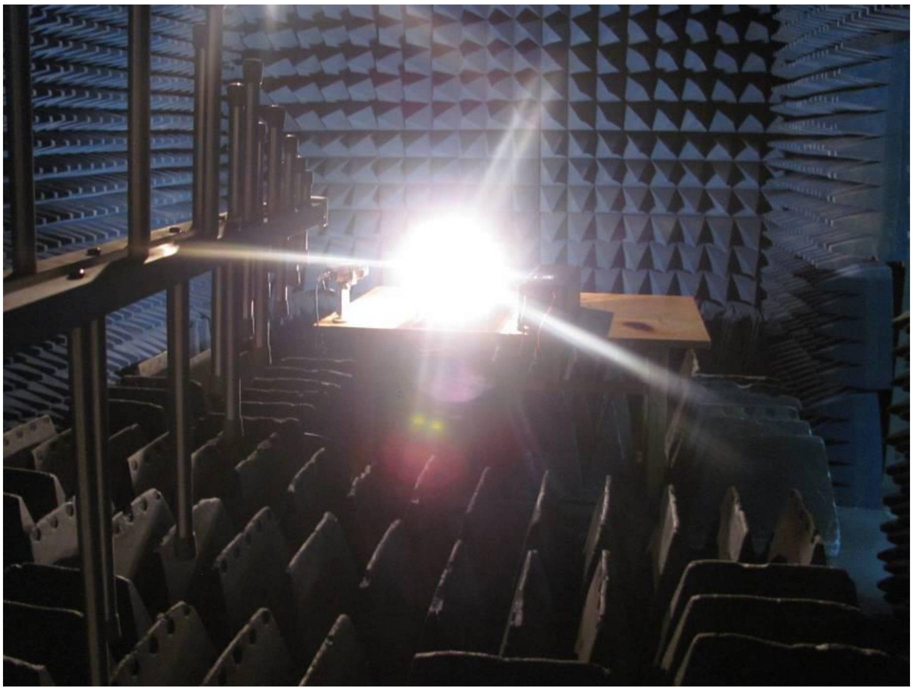


15.3 Photos of Harmonic / Flicker Measurement

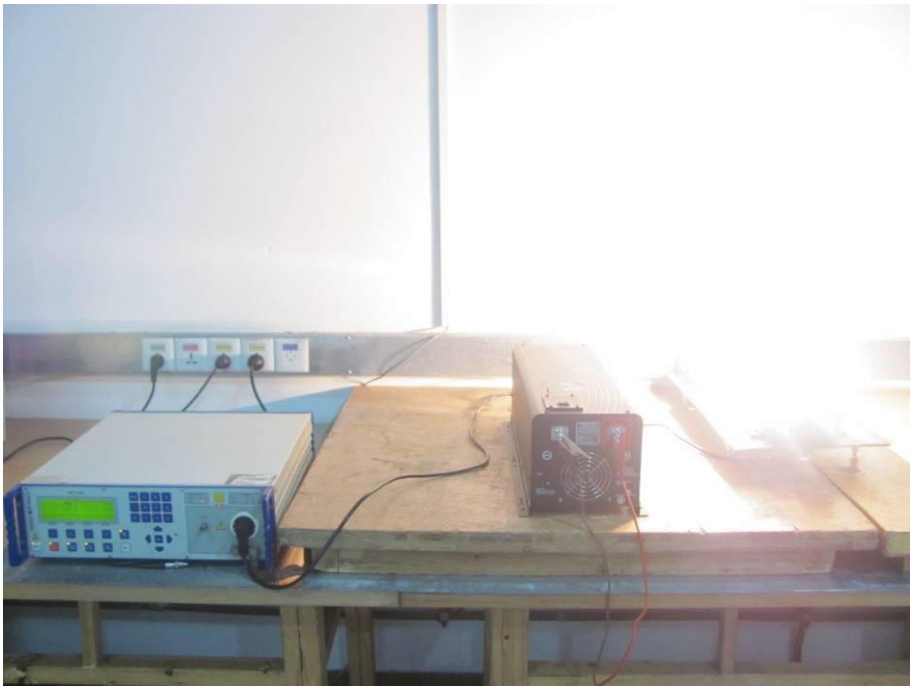


15.4 Photos of Electrostatic Discharge Test

15.5 Photos of RF Field Strength susceptibility Test

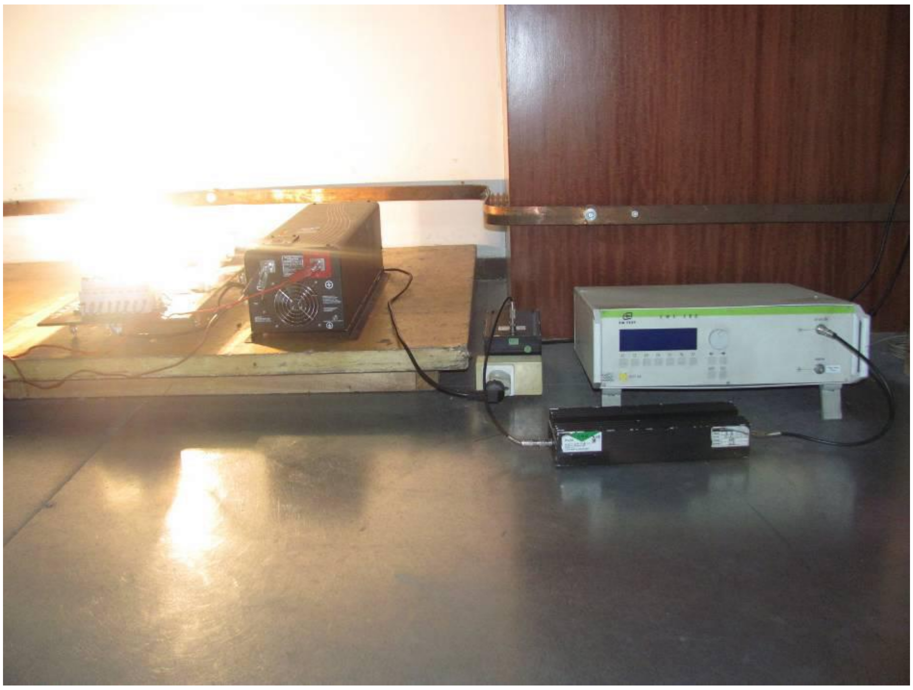


15.6 Photo of Electrical Fast Transient /Burst Test

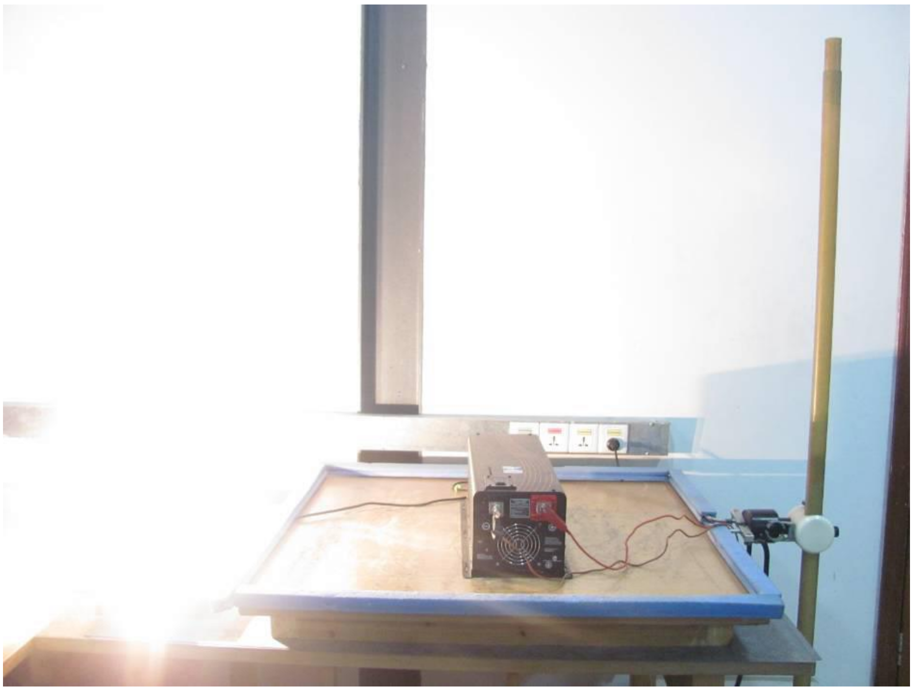


15.7 Photo of Surge Test

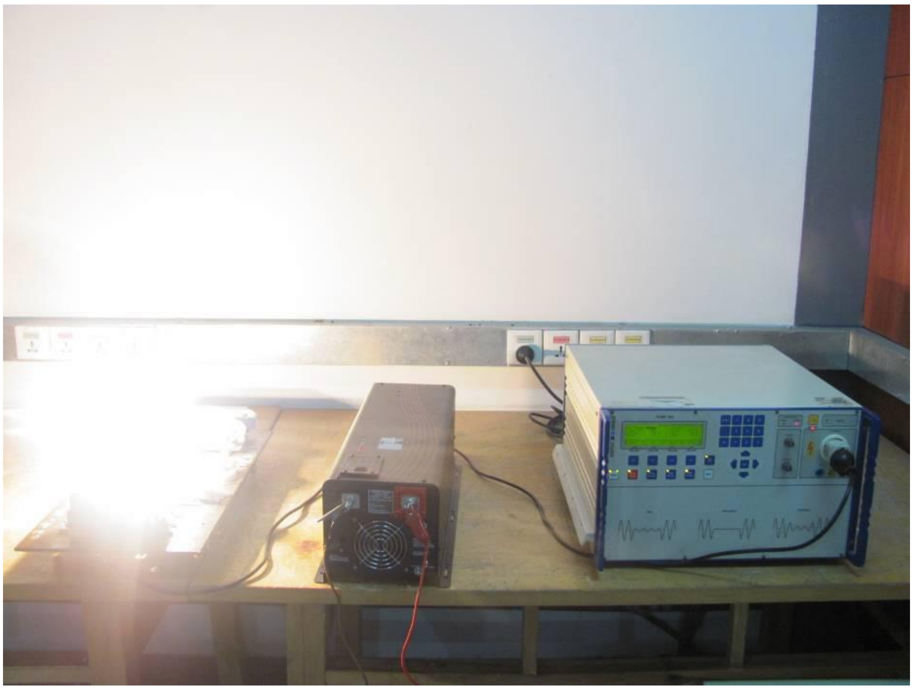
15.8 Photo of Injected Currents Susceptibility Test



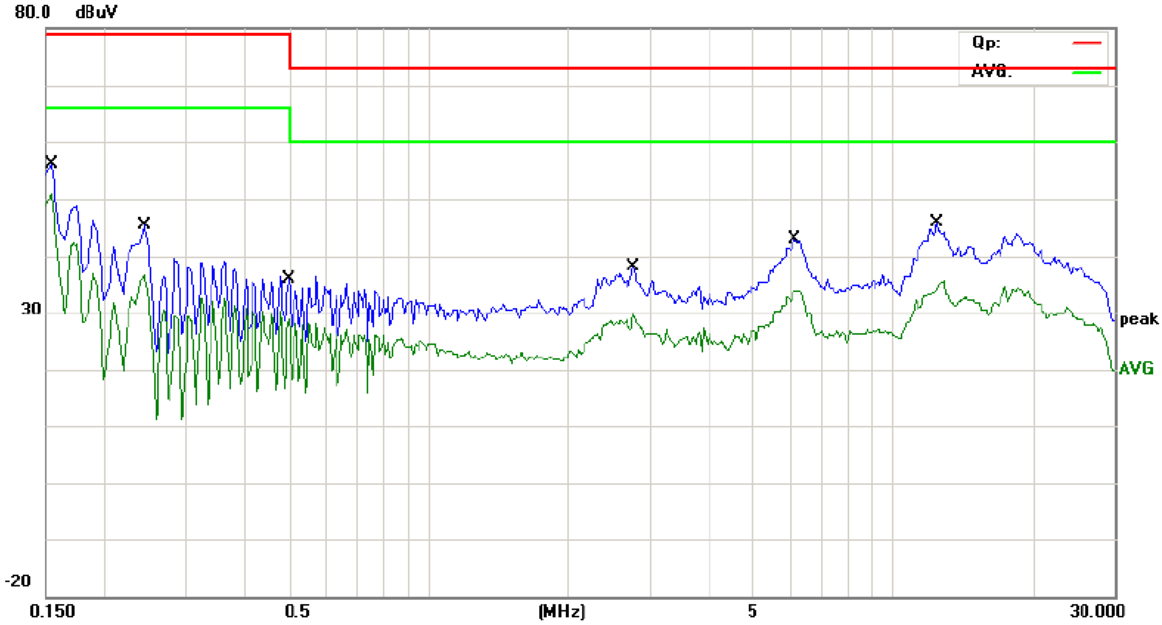
15.9 Photo of Magnetic Field Immunity Test



15.10 Photo of Voltage Dips and Interruption Immunity Test



APPENDIX I



Site Conduction #2 | Phase: L1 | Temperature: 26

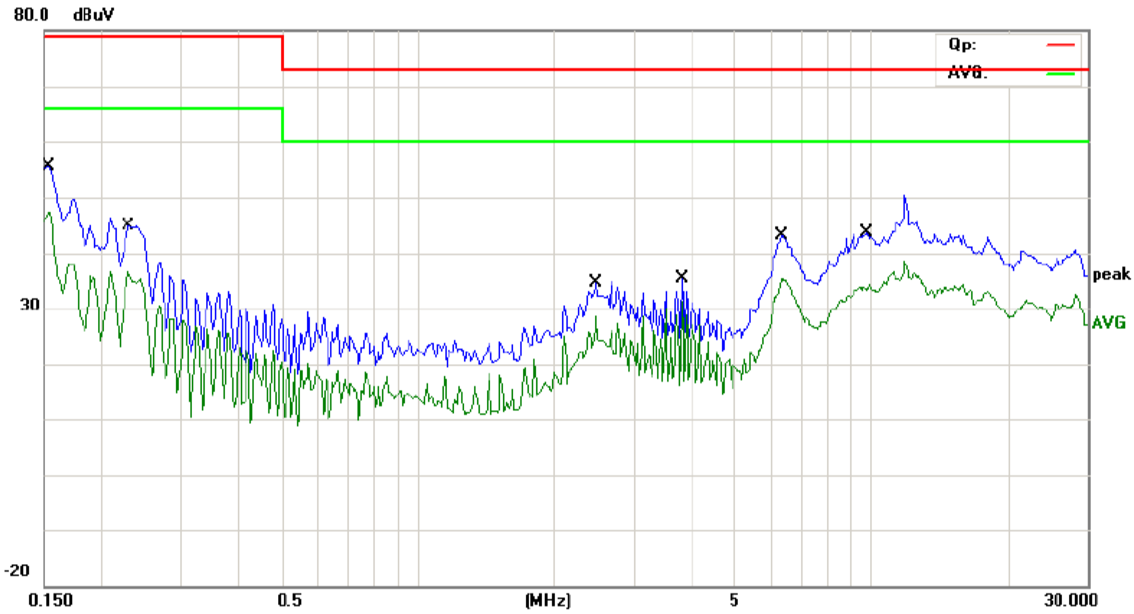
Limit: (CE)EN55022 class A_QP | Power: AC 230V/50Hz | Humidity: 60 %

Mode: FULL LOAD

Note: LINE MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1550	56.17	0.00	56.17	79.00	-22.83	QP	
2	*	0.1550	50.78	0.00	50.78	66.00	-15.22	AVG	
3		0.2450	45.42	0.00	45.42	79.00	-33.58	QP	
4		0.2450	36.55	0.00	36.55	66.00	-29.45	AVG	
5		0.5000	36.43	0.00	36.43	73.00	-36.57	QP	
6		0.5000	28.92	0.00	28.92	60.00	-31.08	AVG	
7		2.7700	38.01	0.00	38.01	73.00	-34.99	QP	
8		2.7700	29.78	0.00	29.78	60.00	-30.22	AVG	
9		6.1400	42.84	0.00	42.84	73.00	-30.16	QP	
10		6.1400	33.80	0.00	33.80	60.00	-26.20	AVG	
11		12.4750	45.76	0.00	45.76	73.00	-27.24	QP	
12		12.4750	35.53	0.00	35.53	60.00	-24.47	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: xzj



Site Conduction #2 Phase: N Temperature: 26

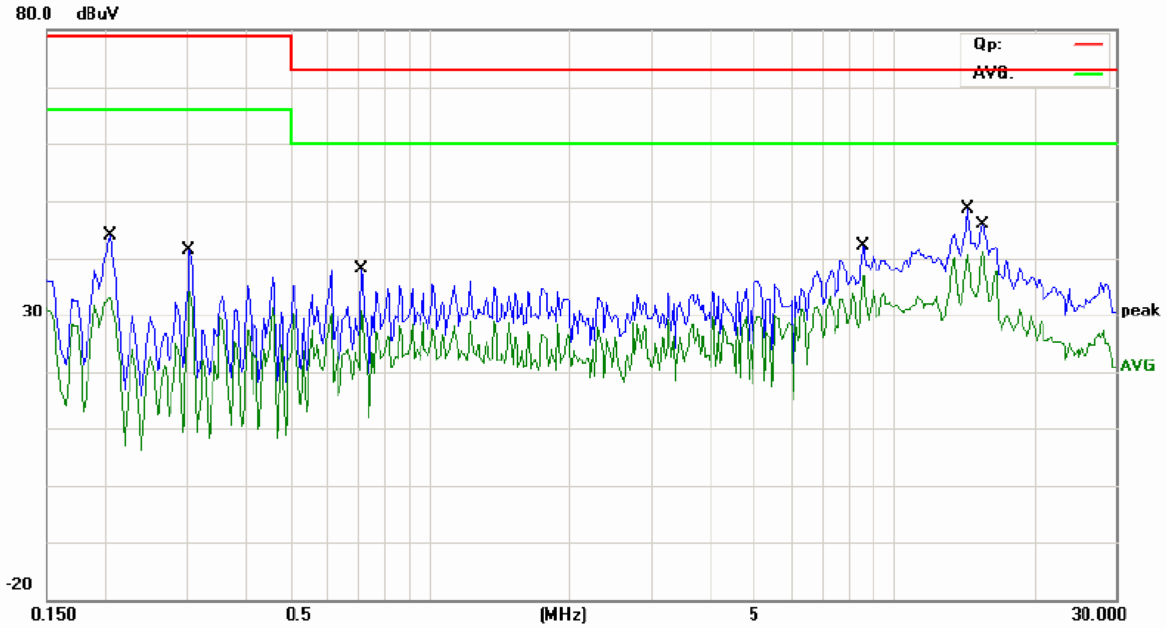
Limit: (CE)EN55022 class A_QP Power: AC 230V/50Hz Humidity: 60 %

Mode: FULL LOAD

Note: LINE MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1540	55.71	0.00	55.71	79.00	-23.29	QP	
2	*	0.1540	47.39	0.00	47.39	66.00	-18.61	AVG	
3		0.2300	44.83	0.00	44.83	79.00	-34.17	QP	
4		0.2300	35.44	0.00	35.44	66.00	-30.56	AVG	
5		2.4800	34.72	0.00	34.72	73.00	-38.28	QP	
6		2.4800	28.53	0.00	28.53	60.00	-31.47	AVG	
7		3.8200	35.36	0.00	35.36	73.00	-37.64	QP	
8		3.8200	31.39	0.00	31.39	60.00	-28.61	AVG	
9		6.3800	43.15	0.00	43.15	73.00	-29.85	QP	
10		6.3800	35.35	0.00	35.35	60.00	-24.65	AVG	
11		9.8300	43.68	0.00	43.68	73.00	-29.32	QP	
12		9.8300	38.62	0.00	38.62	60.00	-21.38	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: xzj



Site Conduction #2 Phase: L1 Temperature: 26

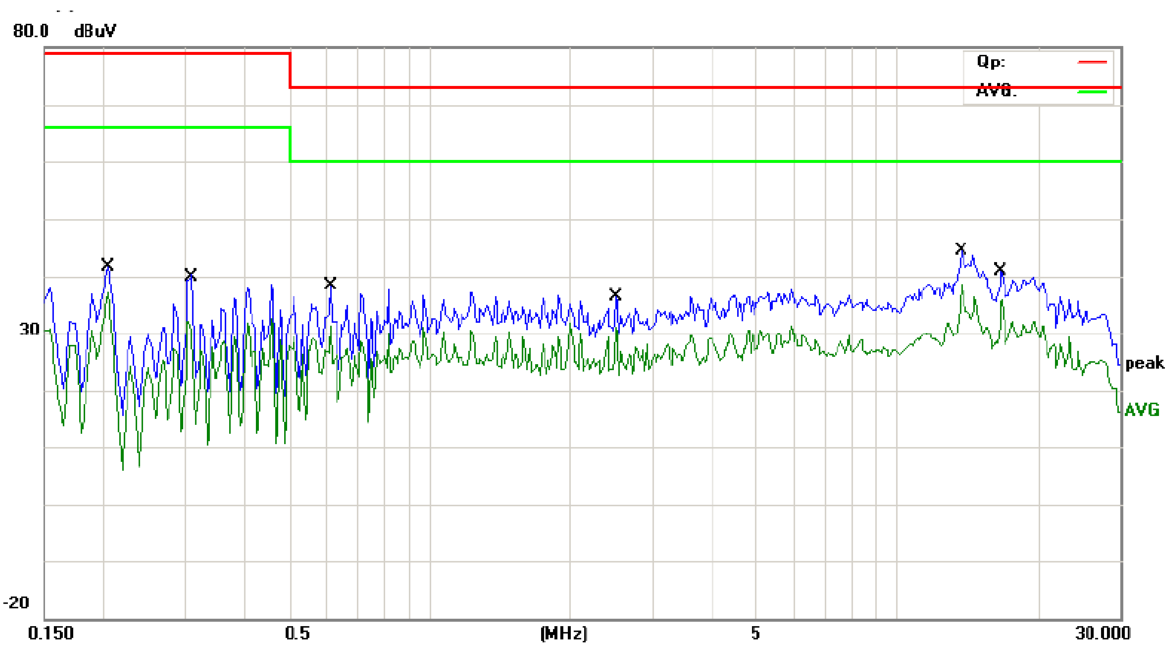
Limit: (CE)EN55022 class A_QP Power: AC 230V/50Hz Humidity: 60 %

Mode: FULL LOAD

Note: BAT MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.2050	43.82	0.00	43.82	79.00	-35.18	QP	
2		0.2050	33.20	0.00	33.20	66.00	-32.80	AVG	
3		0.3050	41.46	0.00	41.46	79.00	-37.54	QP	
4		0.3050	34.12	0.00	34.12	66.00	-31.88	AVG	
5		0.7150	38.19	0.00	38.19	73.00	-34.81	QP	
6		0.7150	30.87	0.00	30.87	60.00	-29.13	AVG	
7		8.5900	42.05	0.00	42.05	73.00	-30.95	QP	
8		8.5900	36.85	0.00	36.85	60.00	-23.15	AVG	
9		14.4750	48.66	0.00	48.66	73.00	-24.34	QP	
10		14.4750	40.69	0.00	40.69	60.00	-19.31	AVG	
11		15.5000	45.80	0.00	45.80	73.00	-27.20	QP	
12	*	15.5000	41.02	0.00	41.02	60.00	-18.98	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: xzj



Site Conduction #2		Phase:	N	Temperature:	26
Limit: (CE)EN55022 class A_QP		Power:	AC 230V/50Hz	Humidity:	60 %

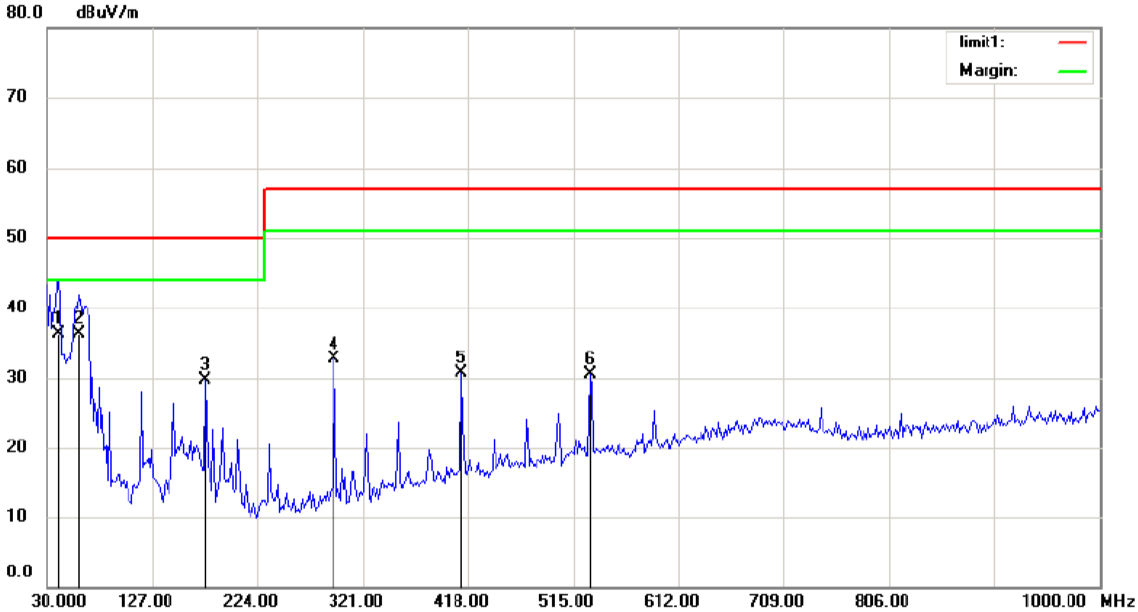
Mode: FULL LOAD

Note: BAT MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.2050	41.69	0.00	41.69	79.00	-37.31	QP	
2		0.2050	37.01	0.00	37.01	66.00	-28.99	AVG	
3		0.3050	40.27	0.00	40.27	79.00	-38.73	QP	
4		0.3050	32.10	0.00	32.10	66.00	-33.90	AVG	
5		0.6150	38.36	0.00	38.36	73.00	-34.64	QP	
6		0.6150	31.29	0.00	31.29	60.00	-28.71	AVG	
7		2.5100	36.49	0.00	36.49	73.00	-36.51	QP	
8		2.5100	31.25	0.00	31.25	60.00	-28.75	AVG	
9		13.7500	44.50	0.00	44.50	73.00	-28.50	QP	
10	*	13.7500	38.52	0.00	38.52	60.00	-21.48	AVG	
11		16.6750	40.88	0.00	40.88	73.00	-32.12	QP	
12		16.6750	35.97	0.00	35.97	60.00	-24.03	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: xzj

APPENDIX II



Site site #1 Polarization: *Vertical* Temperature: 26

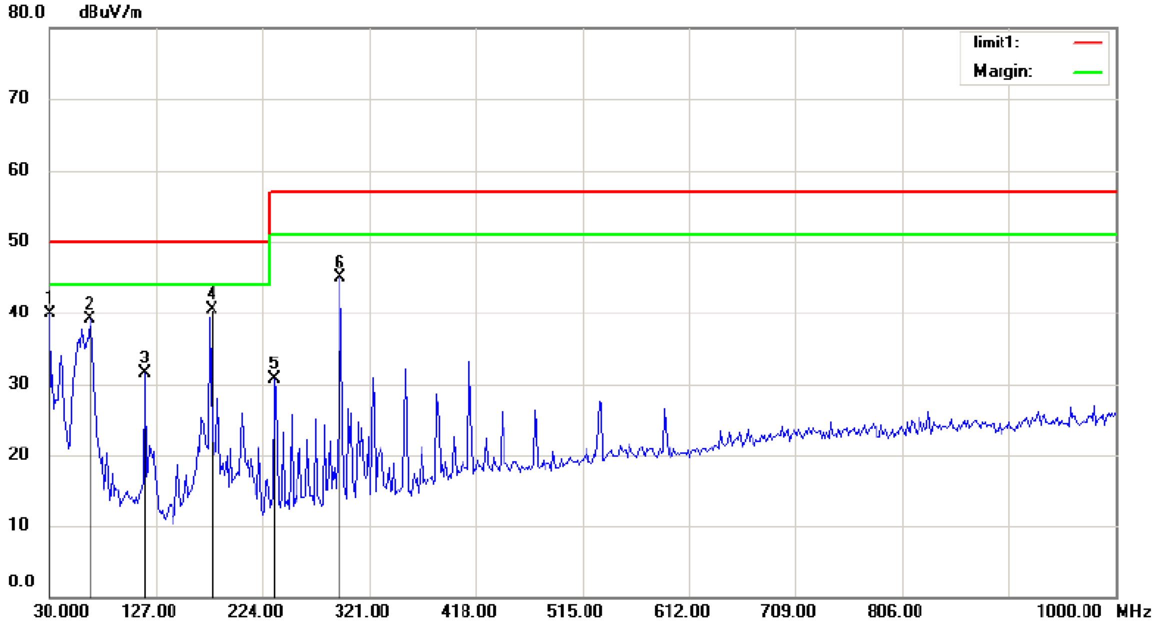
Limit: (RE)EN55022 class A Power: AC 230V/50Hz Humidity: 60 %

Mode:FULL LOAD

Note: LINE MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		40.8814	22.10	14.12	36.22	50.00	-13.78	QP			
2	*	59.5352	23.10	13.18	36.28	50.00	-13.72	QP			
3		176.1217	19.37	10.28	29.65	50.00	-20.35	QP			
4		294.2628	18.90	13.74	32.64	57.00	-24.36	QP			
5		412.4037	13.46	17.27	30.73	57.00	-26.27	QP			
6		530.5448	10.88	19.60	30.48	57.00	-26.52	QP			

*:Maximum data x:Over limit !:over margin Operator: KL



Site site #1 Polarization: *Horizontal* Temperature: 26

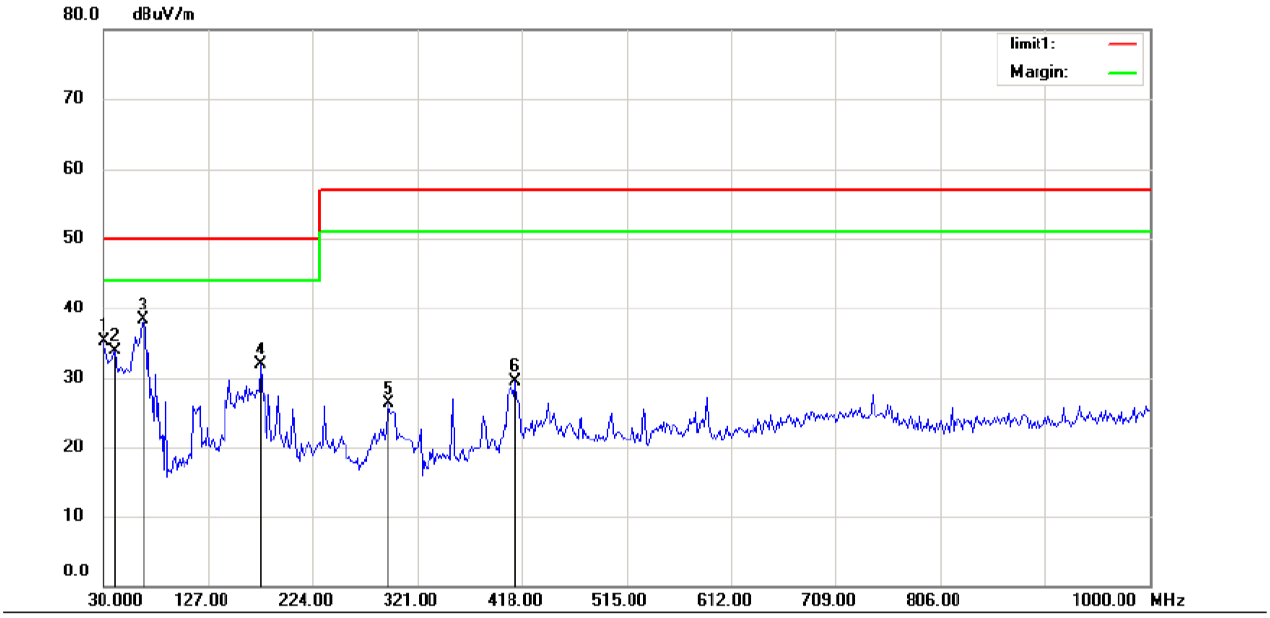
Limit: (RE)EN55022 class A Power: AC 230V/50Hz Humidity: 60 %

Mode:FULL LOAD

Note: LINE MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		30.0000	25.99	13.93	39.92	50.00	-10.08	QP			
2		67.3075	27.62	11.49	39.11	50.00	-10.89	QP			
3		117.0511	19.98	11.48	31.46	50.00	-18.54	QP			
4	*	176.1218	30.40	10.09	40.49	50.00	-9.51	QP			
5		235.1922	17.88	12.84	30.72	57.00	-26.28	QP			
6		294.2628	30.97	13.95	44.92	57.00	-12.08	QP			

*:Maximum data x:Over limit !:over margin Operator: KL



Site site #1 Polarization: *Vertical* Temperature: 26

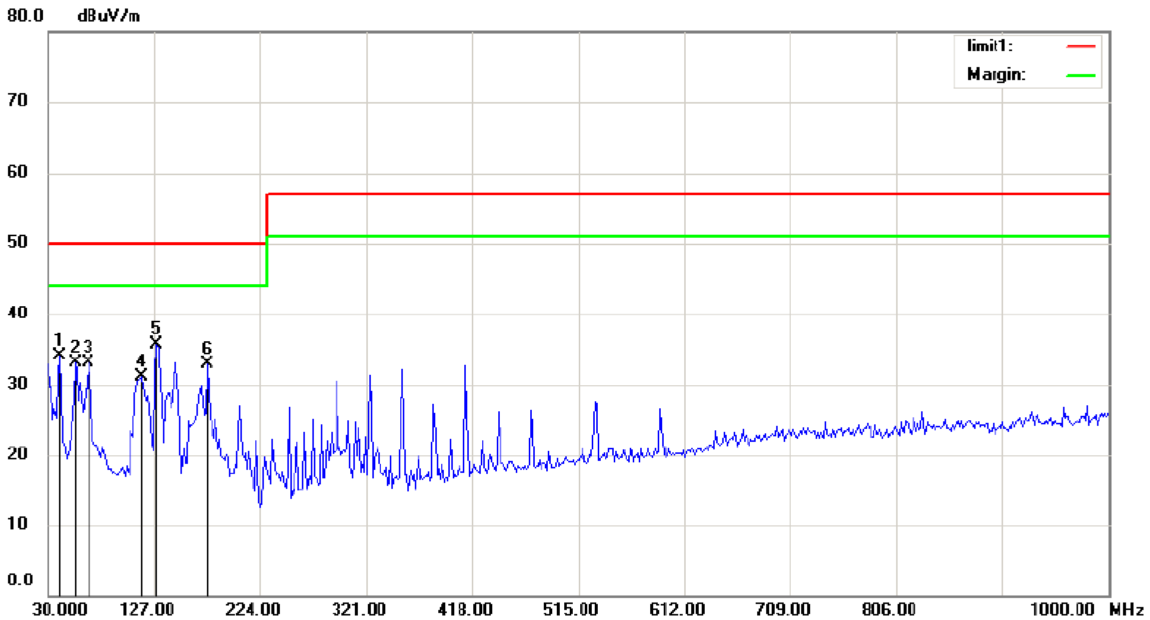
Limit: (RE)EN55022 class A Power: AC 230V/50Hz Humidity: 60 %

Mode:FULL LOAD

Note: BAT MODE

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		30.0000	21.29	13.93	35.22	50.00	-14.78	QP			
2		40.8813	19.62	14.26	33.88	50.00	-16.12	QP			
3	*	67.3075	26.73	11.49	38.22	50.00	-11.78	QP			
4		176.1217	21.87	10.09	31.96	50.00	-18.04	QP			
5		294.2628	12.40	13.95	26.35	57.00	-30.65	QP			
6		412.4037	10.96	18.52	29.48	57.00	-27.52	QP			

*:Maximum data x:Over limit !:over margin Operator: KL



Site site #1 | Polarization: **Horizontal** | Temperature: 26

Limit: (RE)EN55022 class A | Power: AC 230V/50Hz | Humidity: 60 %

Mode:FULL LOAD

Note: BAT MODE

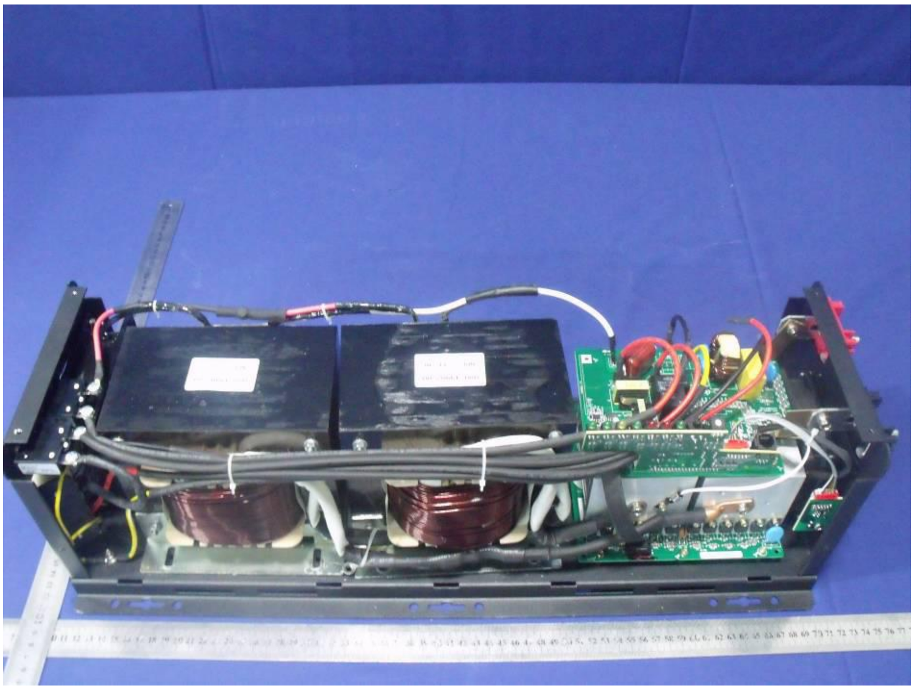
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		40.8813	19.77	14.26	34.03	50.00	-15.97	QP			
2		54.8716	19.61	13.45	33.06	50.00	-16.94	QP			
3		67.3075	21.62	11.49	33.11	50.00	-16.89	QP			
4		115.4967	19.46	11.69	31.15	50.00	-18.85	QP			
5	*	129.4870	25.74	10.00	35.74	50.00	-14.26	QP			
6		176.1217	22.78	10.09	32.87	50.00	-17.13	QP			

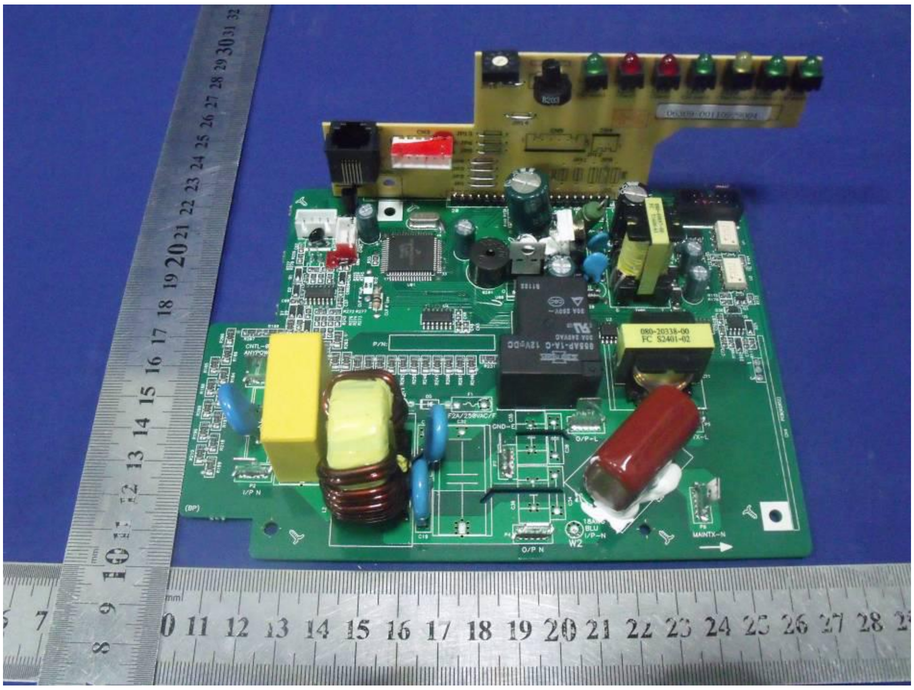
*:Maximum data x:Over limit !:over margin Operator: KL

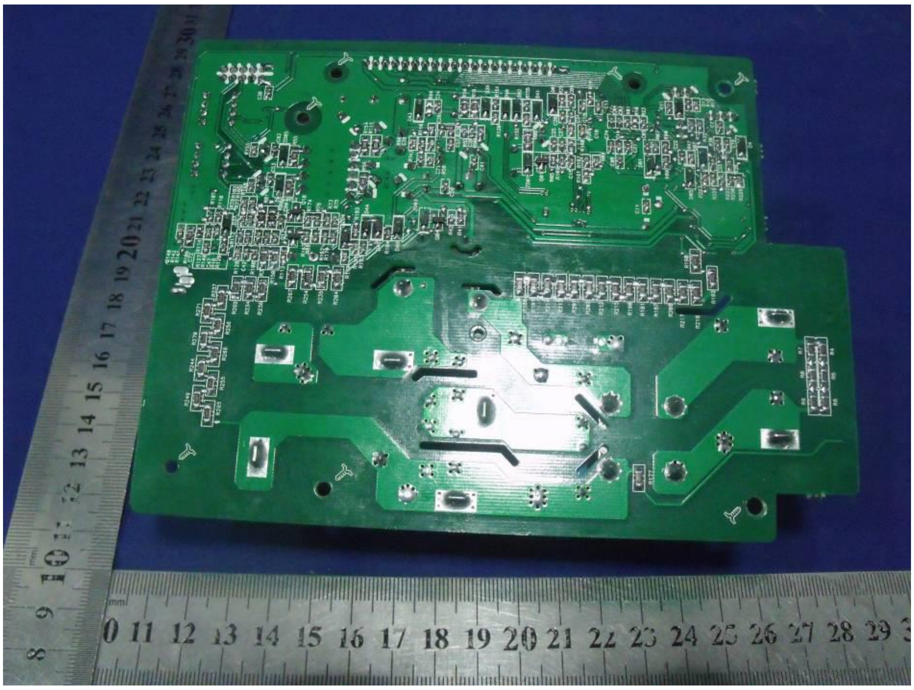
APPENDIX III
(PHOTOS OF EUT)

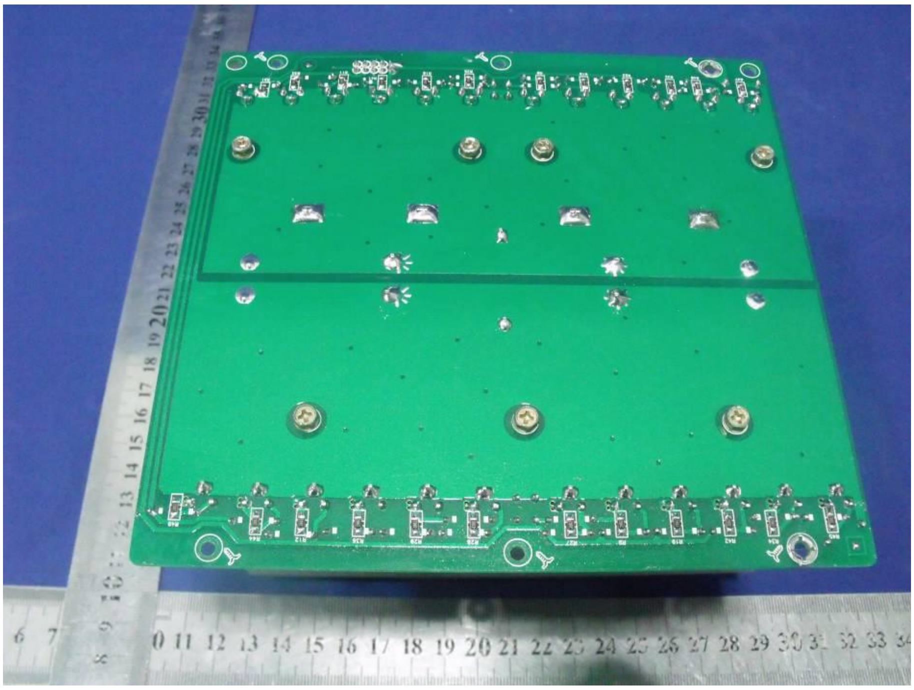
FIGURE 1
GENERAL APPEARANCE OF EUT

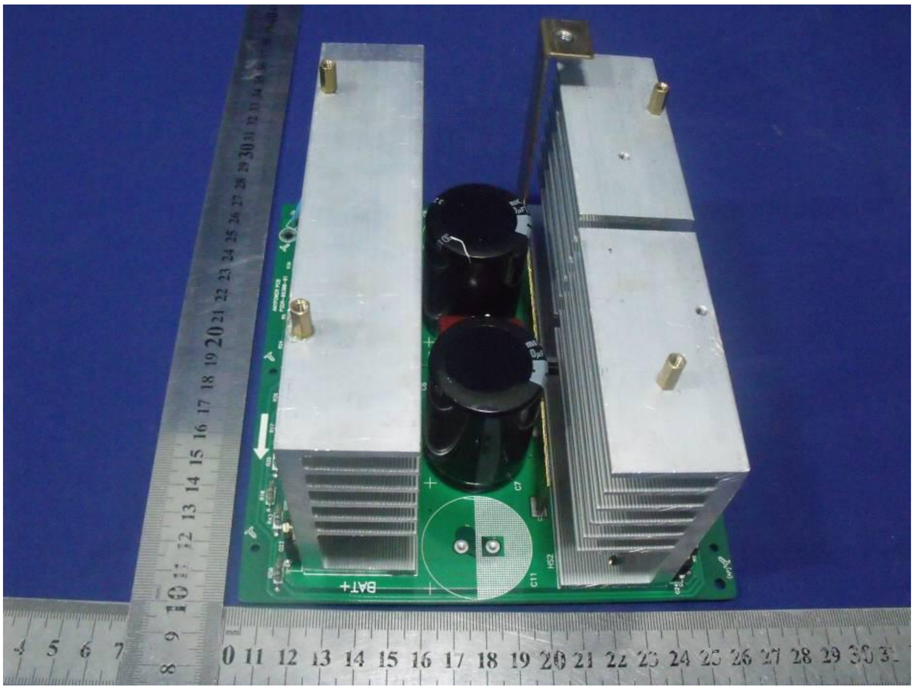
APC6048E










BAT+